Psychological treatment for anorexia nervosa: a neuropsychological perspective

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DEDICATION

This thesis is dedicated in loving memory to my Gran, Joan and my Grandad, Ray. Even though they were not able to see the completion of it, they always believed in me.

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TABLE OF CONTENTS

List of Tables and Figures

Tables

Figures

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ABSTRACT

Objective: AN (anorexia nervosa) is a serious psychiatric disorder with a poor prognosis. An enhanced understanding of the potential maintaining factors of the illness and the identification of efficacious forms of treatment are crucial in order to improve the clinical outcome for this patient population. Three aims were outlined for this thesis: (1) to review the efficacy of psychological therapies for bulimia nervosa (BN) and anorexia nervosa (AN) in outpatient settings; (2) to compare set-shifting ability in inpatients with AN (IAN) and outpatients with AN (OAN) on a battery of specific neuropsychological tests and to examine the effect of body mass index (BMI) and medication on performance; (3) to investigate the differential change in the response profile of neuropsychological measures and eating psychopathology measures across a direct comparison of Cognitive Remediation Therapy (CRT) versus Cognitive Behavioural Therapy (CBT). **Method:** Firstly, a systematic search of randomised controlled trials (RCTs) investigating the efficacy of individually delivered psychological therapies for adults with AN and BN was conducted using 4 electronic databases; PubMed, EMBASE, Medline and PsycINFO. Studies which met a priori inclusion criteria were subsequently systematically reviewed. Secondly, the main empirical study compared 25 IAN with 20 OAN on neuropsychological measures of set-shifting ability. Thirdly, a pilot randomised controlled trial was conducted. 11 participants were randomly allocated to receive 6 sessions of either CRT or CBT. Pre and post treatment assessments of set-shifting ability and eating psychopathology were conducted. **Results**: CBT and IPT were found to be the optimal individually delivered psychological interventions in outpatient settings for the BN population. An optimal form of psychological

intervention for the AN population was unable to be identified due to the small number of published studies. The main empirical study found that IAN and OAN demonstrated impaired set-shifting ability on all of the set-shifting tasks. No significant differences between IAN and OAN were found on any of the set-shifting tasks and neither BMI nor psychotropic medication was related to performance on these measures. The pilot RCT provided tentative evidence to support the efficacy of CRT in AN. **Discussion:** The systematic review highlighted the need for further research investigating the efficacy of psychological treatments in AN utilising robust methodology. The main empirical study found that clinical severity and the use of psychotropic medication are unable to account for the set-shifting deficit demonstrated in AN. The set-shifting impairment demonstrated by both IAN and OAN indicates that both patient populations may benefit from receiving psychological treatment to enhance set-shifting ability. The results of the pilot RCT suggest that CRT may be an efficacious form of treatment for OAN and warrant further investigation in a larger scale study. Sufficient power would enable more conclusive findings regarding the efficacy of CRT in this patient population.

1. INTRODUCTION

1.1 Background

Anorexia Nervosa (AN) is a serious psychiatric condition of unknown aetiology (Kaye, 2008). The disorder has the highest rate of mortality of all psychiatric illnesses with up to 20% of individuals affected dying prematurely (Sullivan, 1995). It is crucial to gain an enhanced understanding of the clinical presentation and the potential maintenance factors of the illness and to develop an evidence base for efficacious forms of treatment in order to enhance the clinical outcomes for patients.

Currently, there is a lack of clear national treatment guidance for AN (NICE, 2004). A limited number of studies have investigated the efficacy of psychological treatment for eating disorders, however, the current literature lacks a review of the existing research specifically evaluating the efficacy of alternate forms of individually delivered psychological therapies for adults with bulimia nervosa (BN) and adults with AN (Bulik, Berkman, Brownley, Sedway & Lohr, 2007; Shapiro, Berkman, Brownley, Sedway, Lohr, & Bulik, 2007).

Set-shifting is defined as the ability to adapt behaviour or thought processes in response to changing demands within the environment (Frederich & Herzog, 2010). Researchers have suggested that impairments in set-shifting ability may maintain AN (Tchanturia, Davies, Roberts, Harrison, Nakazato et al, 2012). However, it has been argued that the relationship between AN and set-shifting ability may be mediated by the consequences of starvation and brain atrophy (Tchanturia,

Morris, Anderluh, Collier, Nikolau et al, 2004). In general, the differentiation of inpatients with anorexia nervosa (IAN) and outpatients with anorexia nervosa (OAN) highlights a variation in nutritional status (BMI) (Woodsie, Carter & Blackmore, 2004). Studies specifically investigating set-shifting in inpatients with anorexia nervosa (IAN) and OAN are limited in number and to date no study has compared these two clinical groups.

Cognitive Remediation Therapy (CRT) is a form of psychological treatment that acts by improving set-shifting ability (Delahunty, Morice & Frost, 1993). There is preliminary research to suggest that CRT improves set-shifting ability and increases BMI in AN (Tchanturia, Davies, Lopez, Schmidt, Treasure & Wykes, 2008). However, an understanding of the specific effects of CRT versus Cognitive Behavioural Therapy (CBT), the most researched form of psychological therapy in AN, on both neuropsychological functioning and eating psychopathology cannot be derived from the current literature.

1.2 Aims and Overview of the Thesis

Each of the following thesis chapters was written up according to the author submission guidelines for the International Journal of Eating Disorders (Appendix 1).

Chapter Two

Chapter 2 is a systematic review of the efficacy of psychological therapies for eating disorders in outpatient settings. The study had 2 aims: (1) to evaluate the efficacy of psychological therapies for adults with BN in outpatient settings, looking specifically at differences in clinical outcomes between alternate forms of individually delivered psychological interventions; (2) To evaluate the efficacy of psychological therapies for adults with AN in outpatient settings, looking specifically at differences in clinical outcomes between alternate forms of individually delivered psychological interventions.

Chapter Three

Chapter 3 is the main empirical study which aimed to compare set-shifting ability in IAN and OAN on a battery of specific neuropsychological tests and to examine the effect of BMI and medication on performance.

Chapter Four

Chapter 4 is the secondary empirical study. It is a pilot study that utilised randomised controlled methodology to examine the efficacy of CRT in OAN and investigate the differential change in the response profile of neuropsychological measures and eating psychopathology measures across a direct comparison of CRT versus CBT.

1.3 REFERENCES

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2. Systematic Review

Title

Psychological interventions for bulimia nervosa and anorexia nervosa: A systematic review of Randomised Controlled Trials

Abbreviated Title

Psychological interventions for eating disorders

WORD COUNT: 5,646 (excluding abstract, references, tables and figures)

2.1 ABSTRACT

Objective: To review the efficacy of psychological therapies for bulimia nervosa (BN) and anorexia nervosa (AN) in outpatient settings, looking specifically at differences in clinical outcomes between alternate forms of psychological intervention. **Method:** A systematic search of randomised controlled trials (RCTs) published between January 1990 and July 2013 was conducted using 4 electronic databases; PubMed, EMBASE, Medline and PsycINFO. Studies were included if they met a priori inclusion criteria. **Results:** Eleven studies met the inclusion criteria; 8 for the BN population and 3 for the AN population. In the BN population CBT and IPT were found to be the optimal individually delivered psychological interventions in outpatient settings. An optimal form of psychological intervention for the AN population was unable to be identified. The current findings are limited due to the small number of published studies and methodological limitations within the literature. **Discussion:** It is recommended that CBT and IPT are routinely offered to patients presenting with BN in outpatient settings. The results indicate that a range of psychological interventions, specifically CBT, CRT, IPT, CAT and FPP, should be considered when working with individuals with AN. The current review highlights the need for further research in this area utilising standardised diagnostic criteria, recruiting a larger number of participants, adopting an adequate method of randomisation and concealment of treatment allocation, "blinding" assessors and excluding concurrent treatment, particularly in the AN population.

Keywords: anorexia nervosa; bulimia nervosa; eating disorders; psychological intervention; psychological therapy; systematic review; evidence-based review

2.2 INTRODUCTION

Eating disorders are psychiatric illnesses that have significant health and psychological implications.[1] They are the subject of current clinical concern with a 16% increase in eating disorder hospital admissions within the United Kingdom (UK) between June 2011 and June 2012.[2] The majority of individuals who seek help for eating disorders receive treatment within outpatient settings.[3] The principal aims of eating disorder treatment are the restoration of weight to within the normal range for height and age, remission from abnormal eating behaviours such as bingeing or purging, the amelioration of weight and shape concerns and the development of a healthy level of control over food. [4]

The Diagnostic and Statistical Manual of Mental Disorders outlines diagnostic criteria for 2 different forms of eating disorder, namely, bulimia nervosa and anorexia nervosa.[5]

2.2.1 Bulimia Nervosa

Bulimia nervosa (BN) is characterised by recurrent episodes of binge eating, the perception of lack of control over eating during binge episodes, the use of recurrent inappropriate compensatory strategies to prevent weight gain and the over-use of body shape and weight to self-evaluate.[5] The incidence of BN is estimated to be 12 per 100,000 per annum.[6] In terms of prognosis, a recent review found that approximately 23% of individuals with BN remain chronically ill, 27% partially recover and 45% make a full recovery.[7] The mortality rate is estimated to be 3.9%.[8]

National treatment guidelines for BN advocate the use of psychological interventions.[3] NICE Guidelines recommend that most adults with BN should be offered a specifically adapted form of Cognitive Behaviour Therapy (CBT).[3] They suggest Interpersonal Psychotherapy (IPT) can be considered as an alternative to CBT but add that patients should be informed that positive treatment outcomes take longer to achieve than with CBT. Although the efficacy of additional psychological therapies has been investigated, no further psychological interventions are documented for use unless they are combined with pharmacological interventions.

The efficacy of a variety of different forms of psychological treatments delivered in outpatient settings has been investigated. These include; CBT;[9-14] CBT plus Exposure and Response Prevention;[15,16] Exposure and Response Prevention;[17] IPT;[9,11] Cognitive Orientation Therapy;[18] Focal Psychotherapy (FP);[14] Self-psychology Psychoanalytic Therapy (SPP);[18] Supportive Expressive Therapy (SET);[10] Behavioural Therapy (BT);[11,13]Dialectical Behavioural Therapy (DBT).[19]

Recently published systematic reviews have attempted to collate the findings of this research. However, they have adopted a broad range of inclusion criteria. Shapiro et al.[20] evaluated the evidence for the efficacy of treatments or a combination of treatments for BN. Their inclusion criteria consisted of participants 10 years of age or older, RCTs of treatment for BN (including pharmacological, psychological and self-help) and original research studies that provide sufficient detail within the method and results to enable use of the data. The criteria did not specifically address the mode of delivery of the psychological therapies or the comparison group. Hay et al.[21] aimed to evaluate the evidence for the efficacy of CBT on binge eating severity and compared it with other forms of psychological therapy in the treatment of adults

with BN, eating disorder not otherwise specified (EDNOS) of a bulimic subtype and binge eating disorder. Their inclusion criteria specified more than one form of eating psychopathology, RCTs, participants over the age of 16, CBT delivered in 3 forms, namely, on an individual basis, in the form of guided self-help and pure self-help and other forms of psychological therapy, non-psychological therapies and no treatment control groups as comparison groups. These broad ranging inclusion criteria result in significant confounding effects when specifically aiming to summarise the efficacy of individually delivered outpatient psychological therapies for BN. Consequently, it can be seen that there is a gap in the current literature on evidencing the most efficacious outpatient psychological therapies for this population.

2.2.2 Anorexia Nervosa

Anorexia nervosa (AN) is characterised by the refusal to maintain healthy body weight for height, a fear of intense weight gain, poor perception of body image and, in females, the absence of 3 consecutive menstrual cycles.[5] The incidence of AN is estimated to be 8 per 100,000 individuals per annum with approximately 90% of these being female.[6] A review of the literature regarding prognosis suggested that 20% of individuals with AN remain chronically ill, 30% partially recover and 50% fully recover.[7] The mortality rate is estimated to be 5.9%, which is substantially higher than that reported for female psychiatric inpatients and for the general population.[22]

There is a lack of current clear treatment guidance for AN. The Eating Disorders Scotland: Recommendations for Management and Treatment document

states that most individuals with AN can be managed in the community on an outpatient basis with psychological input, medical monitoring and dietetic advice.[23] It advocates a choice of psychological interventions which focus on enhancing motivation, modifying attitudes to weight and eating behaviour and on underlying psychosocial issues. It states that the treatment aim is to increase body weight. Nevertheless, no specific intervention models are highlighted or recommended. In contrast, the NICE Guidelines for eating disorders outline a number of psychological interventions to be considered in the treatment of AN.[3] However, it is highlighted that there is tentative evidence regarding the efficacy of these therapies and that there is insufficient evidence to determine which of these psychological interventions are more efficacious than others.

The contemporary AN research literature reflects this lack of understanding. It is acknowledged that there are difficulties in the recruitment of this population into studies due to the relatively small number of affected individuals.[24] A limited number of studies have researched the efficacy of a range of different forms of outpatient psychological interventions in this population. These include; CBT[25-27]; BT[27]; IPT[25]; Cognitive Analytic Therapy (CAT)[28,29]; Self-psychology Psychoanalytic Therapy (SP)[18]; Cognitive Orientation (CO)[18]; Focal Psychoanalytic Psychotherapy (FPP)[28]; Family Therapy (FT)[28] and Cognitive Remediation Therapy (CRT)[30].

Published systematic reviews have attempted to collate the findings of this research. However, they have adopted a broad range of inclusion criteria which is a significant limitation. Bulik et al.[31] evaluated the evidence for the efficacy of treatments or a combination of treatments for AN. Their inclusion criteria consisted of: participants 10 years of age or older, RCTs of treatment for AN (including

pharmacological, psychological and self-help) and original research studies that provide sufficient detail within the method and results to enable use of the data. The modes of delivery of the psychological therapies or the comparison group were not specifically addressed within the inclusion criteria. Hay et al.[32] evaluated the evidence from RCTs for the efficacy of outpatient psychological therapies for older adolescents and adults with AN. Their review included participants aged 16 years and older (although 2 of the 7 included studies recruited participants under the age of 16) and individual psychological therapy compared to pharmacological therapies, treatment as usual, dietary advice or waiting list control group. These broad ranging inclusion criteria have significant confounding effects when aiming to specifically summarise the efficacy of individually delivered outpatient psychological therapies for AN. This has negative clinical implications for AN as National Guidelines are unable to make evidence based recommendations.

2.2.3 Summary

National treatment guidelines advocate the use of psychological interventions in outpatient settings for these patient populations. Previous review papers in this field have adopted broad ranging and general inclusion criteria making it problematic to define the most efficacious treatments for specific groups. Currently, the literature lacks a review of the existing research specifically evaluating the efficacy of alternate forms of individually delivered psychological therapies for adults with BN and adults with AN.

2.2.4 Aims of the current review

1. To evaluate the efficacy of psychological therapies for adults with BN in outpatient settings, looking specifically at differences in clinical outcomes between alternate forms of individually delivered psychological interventions
2. To evaluate the efficacy of psychological therapies for adults with AN in outpatient settings, looking specifically at differences in clinical outcomes between alternate forms of individually delivered psychological interventions.

2.3 METHOD

2.3.1 Inclusion and exclusion criteria

As opposed to the broad nature of the a priori inclusion and exclusion criteria employed within the previously published review articles in this field, a priori inclusion and exclusion were developed to reflect the specific nature of the research question. Table 2.1 outlines these criteria.

Table 2.1 Criteria for the literature search

Category	Criteria
Study population	Humans
	Adults aged between 16 and 65 years
Study settings and geography	All nations
Time period	Published between January 1990 and July 2013
Publication criteria	*Included:*
	Articles written in English language
	Articles in print
	Excluded:
	Articles in non peer-reviewed journals
Study design and other criteria	*Included:*
	Original research article
	Randomised controlled trial methodology
	Psychological therapy compared to an alternate form of psychological therapy
	One to one delivery of psychological intervention
	Participants with a diagnosis of either bulimia nervosa or anorexia nervosa (DSM-III, DSM-III-R, DSM-IV diagnostic criteria or equivalent diagnostic criteria, for example, ICD-10)
	Outpatient setting
	Excluded:
	Any form of self-help psychological therapy
	Combination of psychological and pharmacological intervention

2.3.2 Literature search strategy

Initially, the Cochrane Database of Systematic Reviews was searched to confirm that a comparable review had not been published. The BN search string that was utilised was (psychological therapy OR cognitive behavioural therapy OR cognitive remediation therapy OR interpersonal therapy OR psychodynamic therapy OR cognitive analytic therapy OR motivation enhancement therapy OR psychological treatment OR psychological intervention) AND (bulimia nervosa). The AN search string used was (psychological therapy OR cognitive behavioural therapy OR cognitive remediation therapy OR interpersonal therapy OR psychodynamic therapy OR cognitive analytic therapy OR motivation enhancement therapy OR psychological treatment OR psychological intervention) AND (anorexia nervosa). These search strings retrieved 2 articles, which, as discussed in the introduction, adopt an extensive range of inclusion criteria thereby not specifically addressing the objective of the current review.[21,32]

Manual searching of The International Journal of Eating Disorders and The European Eating Disorders Review, identified 2 further recently published review articles.[20,31] These reviews did not specifically evaluate the efficacy of individually delivered psychological therapies for adults with BN and AN in outpatient settings. The results of these searches indicated that a review with the same objectives and inclusion criteria as the current review had not been conducted previously.

The following 4 electronic databases were then searched on 9th November 2012 to screen articles for inclusion using the above search strings: PubMed, EMBASE, Medline and PsycINFO. In relation to the BN population, this search strategy

resulted in 146 articles being retrieved by PubMed, 22 by EMBASE, 45 by PsycINFO and 51 by Medline. The titles and abstracts of all of these articles were initially used to screen their suitability using the inclusion criteria. This process resulted in the provisional inclusion of 15 studies but after thorough examination of the texts 7 were excluded with 8 remaining for inclusion in the BN population. In relation to the AN population, this search strategy resulted in 54 articles being retrieved by PubMed, 5 by EMBASE, 3 by PsycINFO and 7 by Medline. Again, the titles and abstracts of all of these articles were initially used to screen their suitability using the inclusion criteria. This procedure resulted in the provisional inclusion of 10 studies but examination of the full texts resulted in 8 being excluded with 2 remaining for inclusion in the AN population.

The literature search (described in Tables 2.2 and 2.3) was completed by manually searching the references lists of the provisionally included studies, previously published review articles in the field and relevant journals, namely the International Journal of Eating Disorders and the European Eating Disorders Review.[20,21,30,31] No further articles were found.

An updated literature review was conducted on 2nd July 2013 using the aforementioned search strategy. No further studies were identified within the electronic databases. However, within the manual search, 1 further study was found which met inclusion for the AN population in the International Journal of Eating Disorders.

Consequently, the review paper was based on the 11 identified studies (8 investigating psychological treatment for the BN population and 3 for the AN

population). The literature search processes for the AN population and then BN population are illustrated in Figures 2.1 and 2.2.

Table 2.2. Summary of literature sources and resultant review articles for Bulimia Nervosa Population

Article Source	Number of potentially relevant articles initially screened for inclusion	Number of articles included within this review	Review article number*
Pubmed	146	7	1, 2, 4, 5, 6, 7, 8
Embase	22	1	3
PsycInfo	45	1	4
Medline	51	1	3

*Review article numbers denote the following articles: 1: Agras et al. (2000); 2: Bachar et al. (1999); 3: Bulik et al. (1998); 4: Cooper & Steere (1995); 5: Fairburn et al. (1991); 6: Garner et al. (1993); 7: Ghaderi et al. (2006); 8: Wilson et al. (1991)

Table 2.3. Summary of literature sources and resultant review articles for Anorexia Nervosa Population

Article Source	Number of potentially relevant articles initially screened for inclusion	Number of articles included within this review	Review article number*
Pubmed	54	2	9, 10
Embase	5	2	9, 10
PsycInfo	3	1	10
Medline	7	1	10
Manual Search	26	1	11

*Review article numbers denote the following articles: 9: McIntosh et al. (2005); 10: Dare et al. (2001); 11: Lock et al. (2013)

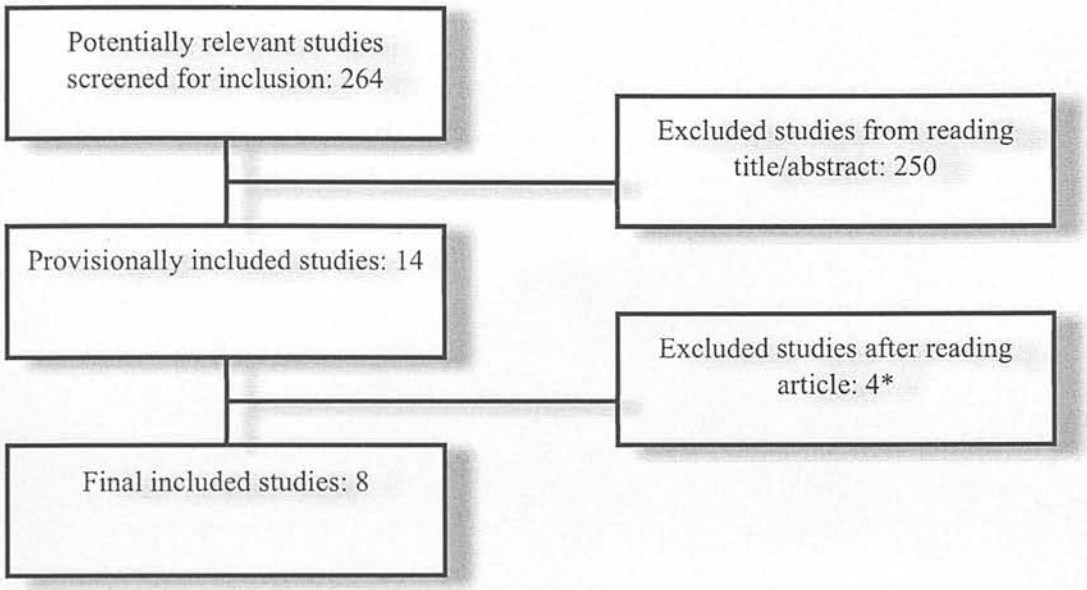

Figure 2.1. Flow chart detailing the literature search process for the Bulimia Nervosa population.

* Fairburn et al.[33] – follow up of a previously published study[11]; Treasure et al.[34] – BN and AN participants mixed in the same treatment group; Katzman et al.[35] – follow up of a previously published study[34]; Thackway et al.[36] – included participants under the age of 16; Treasure et al.[37] – included psychological intervention not delivered by therapist

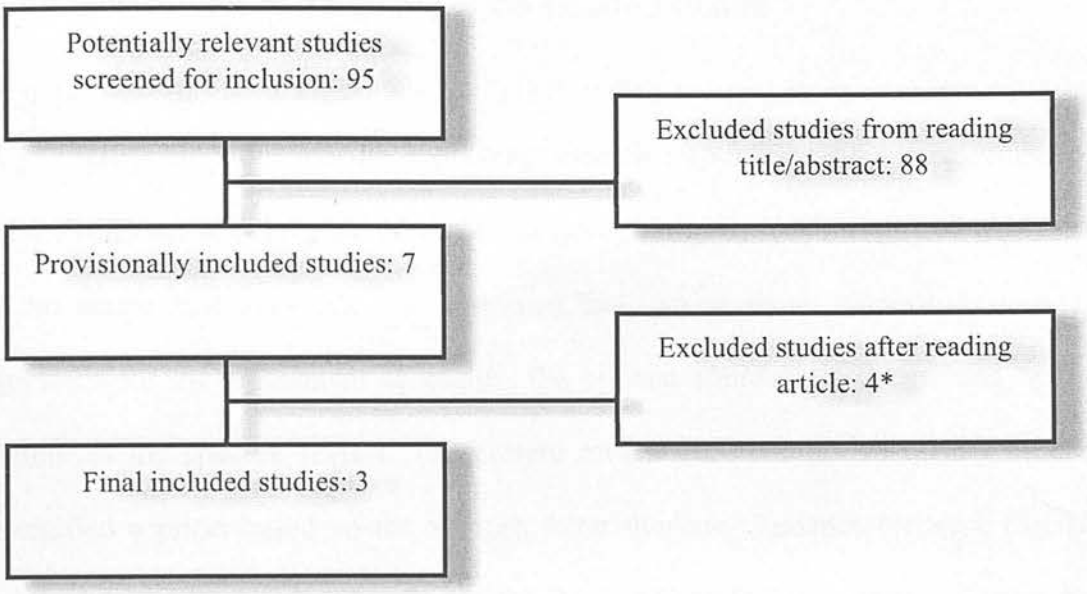

Figure 2.2. Flow chart detailing the literature search process for the Anorexia Nervosa population.

* Bachar et al.[18] – included participants under 16 years of age; Carter et al.[38] – follow up of long term treatment of McIntosh et al.[25]; Wild et al.[39] – a research proposal and not an empirical study; Treasure et al.[29] – AN and BN participants mixed in the same treatment group

2.3.3 Assessment of the quality of the included studies

Different guidelines for appraising research employing randomised controlled trial (RCT) methodology have been developed. However, it is recognized that there is no single best approach.[40] It is argued that, whilst these frameworks provide guidance for the assessment of quality, the optimal approach is determined by the nature of the specific review. The current review incorporates 15 quality criteria identified a priori based on the Scottish Intercollegiate Guidance Network (SIGN) methodology checklist[41], The Centre for Reviews and Dissemination guidance for undertaking reviews[40], The Consolidation Standards for Reporting Clinical Trials Statement[42], the criteria adopted by the previously published systematic review papers[20,21,31,32] and consideration of the review topic. Table 2.7 outlines these criteria.

The outcome ratings outlined by SIGN to assess the methodological quality of RCTs were adopted to evaluate the 15 quality criteria; "well covered" (2 points); "adequately addressed" (1 point), "poorly addressed" , "not addressed" , "not reported" and "not applicable" (all 0 points). Accordingly the highest quality rating each study could achieve was 30.

As suggested within SIGN,[41] in order to reduce the potential bias in the assessment of quality, two independent individuals (KP and EN) rated the studies in addition to MC. KP independently rated 6 studies and EN independently rated 5 studies, therefore, all of the studies were assessed by a second rater. Overall, there was a high level of agreement between the raters. Exact agreement for 89.3% of the criteria was demonstrated between MC and KP and 86.7% between MC and EN. In all of the cases where discrepancy existed, the raters differed by one outcome rating

only, for example defining the criterion as well covered as opposed to adequately addressed.

2.3.4 Assessment of the strength of the evidence

The strength of the evidence for the efficacy of alternate forms of outpatient individually delivered psychological interventions was determined following the framework outlined by Greer et al.[43] Table 2.4 documents the criteria used to rate the strength of the evidence.

Table 2.4. Criteria utilised to rate the strength of the evidence (Greer et al.[43])

Strength Category	Criteria
Good	Evidence from studies of a strong design; the results are both clinically important and consistent, with minor exceptions; the results are free from significant bias and/or difficulties with generalisability and/or flaws within the research design; studies reporting negative results have sufficient sample size and power
Fair	Evidence from studies of a strong design; some uncertainty attached to the conclusion due to inconsistencies within the results and/or difficulties with generalisability and/or flaws within the research design and/or inadequate sample size. Alternatively, the evidence is consistent with the literature but is obtained from studies of a weaker design.
Limited	Evidence from studies of a strong design; substantial uncertainty attached to the conclusion due to inconsistencies within the results and/or difficulties with generalisability and/or flaws within the research design and/or inadequate sample size. Alternatively, the evidence consists of results from a small number of studies with a weaker design.
Opinion only	The support consists of only statements made by researchers/clinicians based either unsubstantiated results of studies or their clinical experience.

2.3.5 Data Synthesis

Data synthesis was not conducted due to the small number of included studies and substantial difficulties in the ability to extract data from a number of the studies.

2.4 RESULTS

A synthesis of the findings from the reviewed studies is presented. The findings for BN and AN are discussed separately.

2.4.1 BN Population

Characteristics of the included studies

Details of the study characteristics and key findings are documented in Table 2.5. The 8 studies identified for inclusion within the review were all RCTs. Of the 8 studies, 3 were conducted in the United States of America,[9,10,12] 2 in the United Kingdom,[14,17] 1 in Israel,[18] 1 in New Zealand[15] and 1 in Sweden.[44] The total number of participants recruited within the 8 studies was 624, ranging per trial from 22 to 220. The mean age at baseline ranged from 19.8 to 28.1 years. The percentage of participants who dropped out of the studies prior to completion ranged between 4.0 and 35.5.

Types of psychological interventions

Psychological interventions investigated for efficacy within the 8 included studies consisted of the following; Cognitive Behavioural Therapy – Bulimia Nervosa (CBT-BN);[9,10,17] Cognitive behavioural Therapy (CBT);[15,11,12,44]

Interpersonal Psychotherapy (IPT);[9,11] Cognitive Orientation Therapy (CO);[18] Self-psychology Psychoanalytic Therapy (SP);[18] Exposure and Response Prevention (ERP) – purge cues;[15] ERP – binge cues;[15] ERP – relaxation;[15] CBT and ERP;[12,17] Behavioural Therapy (BT);[11] Supportive Expressive Therapy (SET).[10]

Comparison of clinical outcomes between psychological interventions

CBT is currently the standard treatment of choice in the BN population. [3] As such, in all but one of the included studies CBT was compared to an alternate form of psychological intervention. One study compared manualized CBT and individually tailored CBT for the treatment of BN.[44] The results indicated that, although both groups demonstrated significant improvement on the EDE, individually tailored CBT was found to be significantly more efficacious than the manualized form in reducing objective bingeing, eating concerns and body shape dissatisfaction. Two studies compared the efficacy of CBT and IPT.[9,11] Agras et al.[9] delivered a BN specific form of CBT (CBT-BN) as opposed to Fairburn et al.[11] who delivered generic CBT. Both studies found that CBT was significantly more efficacious than IPT for reducing purge frequency and dietary restraint. Agras et al.[9] further found that CBT-BN significantly reduced binge frequency when compared to IPT. At 12 month follow up the results of the Agras et al.[9] study indicated no significant difference in clinical outcome between CBT and IPT. IPT was found to have reduced binge and purge frequency to the level observed by CBT at follow-up. One study compared CBT and CBT plus ERP.[17] The experimental results indicated that, at post-treatment, both groups demonstrated significantly fewer episodes of bingeing and purging. No

significant differences across the treatment groups were found. One study compared CBT plus 1 of 2 different forms of ERP, namely, binge cues and purge cues.[15] A significant reduction in binge and purge frequency was demonstrated at mid-point following CBT. No significant effects across the 2 different forms of ERP were found. One study compared CBT and BT.[11] Both groups demonstrated significant reduction in binge and purge episodes. However, CBT was found to be significantly more efficacious than BT for reducing dietary restriction. One study compared CBT and SET.[10] The experimental results indicated that CBT was significantly more efficacious than SET for reducing dietary restraint, eating concerns and body shape dissatisfaction.

The remaining study did not evaluate the efficacy of CBT compared to an alternate form of psychological therapy. The authors compared SP and CO and found that only SP significantly improved BN symptomology, as measured by the EAT. [18]

Quality of the included studies

The quality ratings achieved by each of the 8 studies on the 15 quality criteria are presented in Table 2.7 It should be noted that the quality rating scale adopted is not an exact comparative measure across the studies; however, it does provide a guide to the relative methodological strengths and limitations.

The quality ratings indicate that Agras et al.[9] conducted the strongest methodological study, although the majority of the reviewed studies demonstrated average methodological quality. Two studies were found to be of poor methodological quality.[10,12]

Diagnostic criteria

Five out of the 8 included studies adopted strict standardised diagnostic criteria for BN; 2 adopted DSM-IV criteria[18,44] and 3 adopted DSM-III-R criteria.[9,15,17] The remaining 3 studies recruited participants who did not meet standardised diagnostic criteria. Only 88% of participants within the Fairburn et al.[11] study met DSM-III-R criteria for BN. The remaining 12% met all but one of the DSM-III-R diagnostic criteria; the criterion persistent over concern with weight and shape was not fulfilled. Both Wilson et al.[12] and Garner et al.[10] recruited participants who met DSM-III-R criteria for BN with the exception of the criterion a minimum average of 2 binges per week involving large amounts of food.

Assignment of participants

Of the 8 included studies, only 1 fully described the randomisation procedure, which was a biased coin randomisation.[9] Six out of the 8 included studies reported that the participants were randomly assigned to the treatment groups but did not document the method of randomisation undertaken.[11,12,15,17,18,44] In 1 of the included studies the authors reported that although they utilised a randomisation procedure, some of their participants were assigned to treatment groups based solely on therapist availability.[10] They do not report exactly how often this occurred.

Concealment of treatment allocation

None of the 8 included studies documented the method of ensuring that the treatment assignment sequence was concealed until the intervention was assigned or indicated whether a method of concealment had been utilised.[9-12,15,17,18,44]

Assessors kept "blind" to treatment allocation

Four out of the 8 included studies documented that the assessors were "blind" to the treatment allocation of the participants.[9,11,15,17] In 1 of the studies an independent assessor who was "blind" to the patient population of the participants interpreted 1 of the outcome measures.[18] However, the authors do not detail who administered and interpreted the 3 other outcome measures utilised within the study. Two of the included studies documented that the assessors were not "blind" to treatment allocation.[10,44] The remaining study did not report who undertook the assessments.[12]

Concurrent treatment exclusion

Of the 8 included studies only 2 excluded both psychological and pharmacological concurrent treatment.[9,11] One study excluded concurrent psychological treatment but did not make reference to pharmacological treatment[44] and one study excluded concurrent pharmacological treatment but did not make reference to psychological treatment.[15] Three studies reported the exclusion of

concurrent treatment for BN but did not report whether participants received concurrent psychological or pharmacological treatment for any other forms of illness.[10,12,17] The remaining study did not make reference to concurrent treatment.[18]

Treatment integrity

In 4 out of the 8 included studies treatment sessions were audio-taped and a random sample of the tapes was audited by an independent assessor.[9,10,18,43] Although treatment integrity was robustly assessed within the Ghaderi[43] study, in 35% of the randomly chosen sessions, the researcher is reported to have utilised additional strategies not included within the study protocol. The remaining 4 studies audio-taped treatment sessions but either did not have them independently assessed for treatment integrity or did not report who audited them.[11,12,15,17]

2.4.2 AN Population

Characteristics of the included studies

Details of the study characteristics and key findings are documented in Table 2.6. The 3 studies identified for inclusion within the review were all RCTs. Of the 3 studies, 1 was conducted in the United Kingdom[28], 1 in New Zealand[25] and 1 in the United States of America.[30] The total number of participants recruited within the 3 studies was 186, ranging per trial from 46 to 84. The mean age at baseline was only reported in 2 of the studies and ranged per trial from 22.7 to 26.3 years. The other

study documented the age range instead of the mean age, which was 17 to 40 years. The percentage of participants who dropped out of the studies prior to completion ranged between 22.1 and 37.5.

Types of psychological interventions

Psychological interventions investigated for efficacy within the 3 included studies consisted of the following; CBT;[25,30] IPT;[25] Cognitive Remediation Therapy (CRT);[30] Focal Psychoanalytic Psychotherapy (FPP);[28] Cognitive Analytic Therapy (CAT).[28]

Comparison of clinical outcomes between psychological interventions

One study compared CBT and IPT.[25] The experimental results indicated that both groups demonstrated significant improvement on the primary outcome measure (Global Anorexia Nervosa Rating), however, no significant effects across the groups were found. One study compared CRT plus CBT and CBT.[30] The attrition rate was lower in the CRT plus CBT group in comparison to the CBT group. BMI significantly improved in both groups, however, there was no difference between groups. The remaining study compared FPP and CAT.[28] Both groups demonstrated significant improvement on the Morgan-Russell Psychiatric Interview subscales, with the exception of overall psychiatric rating. However, no significant differences between FPP and CAT were found on the Morgan-Russell Psychiatric Interview.

Quality of the included studies

The quality ratings achieved the 3 studies on the 15 quality criteria are presented in Table 2.7.

The quality ratings suggest that Dare et al.[28] conducted the methodologically stronger study, however, all of the studies were found to demonstrate average quality.

Diagnostic criteria

Only 1 of the studies adopted strict standardised diagnostic criteria for AN, namely DSM-IV criteria.[28] One study adopted both the standardised DSM-IV weight criterion for AN and a modified lenient weight criterion for inclusion within their study.[25] The remaining study reported that participants met diagnostic criteria for AN with the exception of the amenorrhea criterion, however, did not report what form of diagnostic criteria were utilized.[30]

Assignment of participants

Two of the included studies defined which form of randomization was utilised.[28,30] One study[28] adopted a stratified randomisation method controlling for 3 variables; age of AN onset, the presence of bulimic symptoms and marital status and one study a used computer-generated block randomization method.[30] The remaining study documented that participants were assigned to treatment groups but did not expand on the method they used to undertake the randomization.[25]

Concealment of treatment allocation

Only 1 of the included studies reported a method of ensuring that the treatment assignment sequence was concealed until the intervention was assigned.[28] The authors documented that the treatment allocation was concealed within sealed envelopes.

Assessors kept "blind" to treatment allocation

In 2 out of the 3 included studies the assessors were "blind" to treatment allocation.[25,30] Dare et al.[28] documented that a "blind" assessor conducted the initial assessment, however, assessors who were not "blind" to treatment allocation undertook the follow up assessments.

Concurrent treatment exclusion

Two of the 3 included studies made reference to concurrent treatment exclusion.[25,30] One reported that 2 of the participants within the study were concurrently undertaking a pharmacological intervention[25] and the other stated that participants were included in the study if they had received a stable dose of psychotropic medication for a minimum of 2 months.[30] Dare et al.[28] did not make reference to concurrent treatment exclusion.

In 1 out of the 3 included studies treatment sessions were audio-taped and a random sample of the tapes was audited.[25] Supervision was provided at regular intervals to all of the therapists within the 2 remaining studies as a form of monitoring treatment integrity.

Table 2.5. Characteristics of the included studies – BN population

Author and Study Location	Diagnostic criteria	Sample size	Completers (%)	% female	Mean age at baseline in years (S.D)	Intervention Arms	Number of treatment sessions	Primary outcome measure	Post-treatment effect size	Key findings
Bulimia Nervosa (BN) Population										
Agras et al. (2000) United States of America	DSM-III-R	220	129 (64.5)	100	28.1 (7.2)	CBT – BN vs. IPT	CBT-BN – 19 sessions; IPT – 19 sessions	EDE	NR	**At post-treatment** – CBT significantly more efficacious than IPT in relation to reducing objective binge episodes, purging and dietary restraint. **At 12 month follow up** – No significant differences between groups.

Table 2.5. Characteristics of the included studies – BN population

Bachar et al. (1999) Israel	DSM-IV	31	25 (80.6)	100	24.1 (3.3)	SP vs. CO vs. NC (NC not included in the review)	Actual number not given SP – 1 session per week for 1 year; CO – 1 session per week for 1 year	EAT–26	0.46	**At post-treatment** – Only SP group significant improvement as measured by the EAT. **At 12 month follow up** – Not included in the review (BN and AN results mixed in analysis)

Table 2.5. Characteristics of the included studies – BN population

Bulik et al. (1998) New Zealand	DSM-III-R	135	106 (78.5)	100	26.1 (6.1)	CBT & ERP-B vs. CBT & ERP-P vs. CBT & ERP-R (CBT & ERP-R not included in the review)	CBT & ERP-B – 8 sessions CBT followed by 8 sessions of either ERP-B; CBT & ERP-P – 8 sessions CBT followed by 8 sessions of either ERP-P	Binge and Purge frequency	NR	**At mid point** – Significant reduction in binge and purge frequency following CBT. **At post-treatment** – No significant effects across the 2 groups on primary outcome measure.

Table 2.5. Characteristics of the included studies – BN population

Cooper and Steele (1995) United Kingdom	DSM-III-R	31	27 (87.1)	100	23.8 (SD not given – range 18-33 years)	CBT vs. ERP & CBT	CBT – 19 sessions (first 8 and last 3 sessions same as ERP group); ERP & CBT – 8 sessions of CBT followed by 8 sessions of ERP followed by 3 sessions of CBT	Binge and Purge frequency	NR	**At mid point** – No significant differences across the groups **At post-treatment** – Significant improvement across both groups on primary outcome measure. **At 12 month follow up** – Significant differences across groups. ERP & CBT group demonstrated increased frequency of vomiting as opposed to post-treatment. CBT group demonstrated a slight reduction in these behaviours.

Table 2.5. Characteristics of the included studies – BN population

Fairburn et al. (1991) United Kingdom	DSM-III-R and modified DSM-III-R	75	53 (70.7)	100	24.2 (SD not given – 95% confidence interval 22.8-25.6)	CBT vs. BT CBT vs. IPT	CBT – 19 sessions; BT – 19 sessions; IPT – 19 sessions	EDE	NR	**At post-treatment** – Significant reduction in binge episodes, but no significant differences across groups. CBT significantly more efficacious than BT and IPT at reducing extreme dieting. CBT significantly more efficacious than IPT at reducing self-induced vomiting (no significant difference across CBT and BT).

Table 2.5. Characteristics of the included studies – BN population

Garner et al. (1993) United States of America	Modified DSM-III-R	60	50 (83.3)	100	CBT Group – 23.7 (4.4) SET Group – 24.6 (4.0)	CBT vs. SET	CBT – 18 sessions; SET – 18 sessions	EAT	NR	**At post-treatment –** CBT significantly more efficacious than SET at reducing dietary restraint, eating concerns, disturbed attitudes towards shape.

Table 2.5. Characteristics of the included studies – BN population

Ghaderi (2006) Sweden	DSM-IV	50	48 (96)	NR	27.2 (7.8)	Manualised CBT vs. Individualised CBT	Manualised CBT – 19 sessions; Individualised CBT – 19 sessions	EDE	0.5	**At post-treatment** – Significant improvement post-treatment for both groups. Individualised CBT demonstrated significantly reduced objective bulimic episodes, eating concerns and body shape dissatisfaction. **At 6 month follow up** – Improvement maintinated at follow up across both groups. Individualised CBT demonstrated significantly reduced objective bulimic episodes, eating concerns and body shape satisfaction.

Table 2.5. Characteristics of the included studies – BN population

Wilson et al. (1991) United States of America	Modified DSM-III-R	22	18 (77.3)	NR	CBT group – 19.8 (SD not given); CBT & group – 21.6 (SD not given)	CBT vs. CBT & ERP	CBT – 20 sessions; CBT & ERP – 20 sessions	EDE	NR	**At post-treatment** – Significant reduction in binge eating, purging, restraint, weight concern, shape concern and eating concern – no significant differences across groups. **At 3 month follow-up** – No significant change. **At 12 month follow-up** – No significant change.

NR: Not Reported; CBT: Cognitive Behavioural Therapy; IPT: Interpersonal Psychotherapy; EDE: Eating Disorders Examination; ERP: Exposure and Response Prevention; SP: Self-psychology psychoanalytic therapy; CO: Cognitive Orientation Therapy; NC: Nutritional Counseling; EAT: Eating Attitudes Test; ERP-B: Exposure and Response Prevention purge cues; ERP-B: Exposure and Response Prevention binge cues; ERP- R: Exposure and Response Prevention relaxation; SRQ: Self-Reporting Questionnaire; BDI: Beck Depression Inventory; RSE: Rosenburg Self Esteem; STAI-I and II: State Trail Anxiety Inventory; BT: Behavioural Therapy; SET: Supportive Expressive Therapy; MET: Motivational Enhancement Therapy

Table 2.6. Characteristics of the included studies – AN population

Author and Study Location	Diagnostic criteria	Sample size	Completers (%)	% female	Mean age at baseline in years (S.D)	Intervention Arms	Number of treatment sessions	Primary outcome measure	Post-treatment effect size	Key findings
Anorexia Nervosa (AN) Population										
Dare et al. (2001) United Kingdom	DSM-IV	84	65 (77.9)	97.64	26.3 (6.7)	FPP vs. FT vs. CAT vs. RT (RT and FT components not included in the review)	FPP - weekly for 1 year; CAT - weekly for 20 weeks then monthly for 3 months; RT - frequency not given	MR	NR	**At post-treatment** – Significant improvement on MR other than Overall Psychiatric rating, however, no significant differences between groups on any of the MR rating scales.

Table 2.6. Characteristics of the included studies – AN population

Locke et al. (2013) United States of America	NR	46	32 (69.6)	89	22.7 (5.9)	CRT plus CBT vs CBT	CRT plus CBT - 8 sessions of CRT then 16 sessions of CBT; CBT – 24 sessions	Study drop out	Reported as moderate to large	**At post-treatment** – Attrition rates lower in CRT compared with CBT. Significantly greater improvement in set-shifting in CRT group. Significant improvement in BMI, however, no significant difference between groups.
McIntosh et al. (2005) New Zealand	DSM-IV and modified DSM-IV	56	35 (62.5)	100	NR Range reported – 17-40 years	CBT vs. IPT vs. CMSP (CMSP not included in the review)	CBT – 20 sessions; IPT – 20 sessions; CMSP – 20 sessions	Global anorexia nervosa rating	NR	**At post-treatment** – Significant difference in primary outcome but CBT and IPT outcome did not differ significantly.

NR: Not Reported; MR: Morgan-Russell Psychiatric Interview; CBT: Cognitive Behavioural Therapy; IPT: Interpersonal Psychotherapy; CRT: Cognitive Remediation Therapy; CMSP: non-specific clinical management and supportive psychotherapy; FPP: Focal Psychoanalytic Psychotherapy; FT: Family Therapy; CAT: Cognitive Analytic Therapy; RT: Routine Treatment (low contact, outpatient management)

Table 2.7. Assessment of quality for the included studies

Study	Quality Criteria*															Quality
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Rating
Bulimia Nervosa																
Agras et al.	WC	WC	NR	WC	WC	AA	WC	WC	PA	WC	WC	WC	AA	WC	WC	*24*
Bachar et al.	WC	PA	NR	PA	AA	WC	NR	WC	NA	WC	PA	Nad	WC	WC	WC	*15*
Bulik et al.	WC	PA	NR	WC	AA	AA	AA	WC	NA	AA	WC	NR	AA	WC	AA	*16*
Cooper & Steele	WC	PA	NR	WC	PA	AA	PA	WC	NA	WC	AA	NR	WC	WC	AA	*15*
Fairburn et al.	PA	PA	NR	WC	PA	WC	WC	WC	NA	WC	Nad	AA	WC	WC	AA	*16*

Table 2.7. Assessment of quality for the included studies

Garner et al.	PA	PA	NR	Nad	AA	AA	PA	WC	NA	PA	Nad	NR	WC	AA	WC	*9*
Ghaderi et al.	WC	PA	NR	Nad	WC	PA	AA	WC	NA	WC	WC	NR	WC	AA	PA	*14*
Wilson et al.	PA	PA	NR	NR	PA	PA	PA	WC	NA	NR	NR	NR	AA	WC	PA	*5*
Anorexia Nervosa																
Dare et al.	WC	AA	WC	PA	WC	WC	NR	WC	NA	WC	WC	Nad	WC	WC	AA	*20*
Locke et al.	PA	WC	NR	WC	AA	AA	WC	WC	NA	WC	PA	NR	WC	WC	AA	*17*
McIntosh et al.	PA	PA	NR	WC	AA	AA	PA	AA	NA	WC	WC	NR	WC	WC	WC	*15*

WC: well covered; AA: adequately addressed; PA: poorly addressed; Nad: not addressed; NR: not reported; NA: not applicable

* 1: All participants met standardised diagnostic criteria (e.g. DSM/ICD); 2: The assignment of participants to treatment groups is randomised; 3: An adequate concealment method is used; 4: The assessors are kept "blind" about treatment allocation; 5: The treatment groups are similar at the start of the trial; baseline scores described and differences across groups assessed when appropriate; 6: The only apparent difference between groups is the

treatment under investigation; adjustment for confounding variables or adequate statistical control; 7: Concurrent treatment exclusion; 8: Primary outcome measures are evidenced to be both valid and reliable; 9: Where the study is carried out at more than one site, participant characteristics are comparable for all sites; 10; Number of patients approached to participate and levels of attrition are reported; 11: Intention to treat analyses are reported and missing values are imputed; 12: A power calculation is reported and sufficient power is achieved; 13: The trial demonstrates external validity; evaluating the intervention within a clinically relevant setting and for an appropriate duration; 14: The intervention is sufficiently defined; 15: Treatment integrity is demonstrated; checking adherence to treatment manual/protocol (supervision, audiotape)

2.5 DISCUSSION

The current review is the first to evaluate the efficacy of psychological therapies for adults with AN or BN in outpatient settings, looking specifically at differences in clinical outcomes between alternate forms of individually delivered psychological interventions.

2.5.1 Strength of the evidence

BN Population

The strength of the evidence was determined following the framework outlined by Greer et al.[43] which is documented in Table 2.4.

The strength of the evidence indicating that CBT is more efficacious than IPT at post-treatment was found to be fair. The strength of the evidence suggesting that IPT is as efficacious as CBT in the longer term, specifically, at 12 months post-treatment was found to be limited. The following evidence was found to be of limited strength; Individually tailored CBT is more efficacious than manualized CBT; CBT is more efficacious than BT; CBT is more efficacious than SET; SP is more efficacious than CO. However, it is important to note that CO did not significantly improve clinical outcome. The current review found no evidence to suggest that CBT plus ERP is more efficacious than CBT.

AN Population

No evidence was found to indicate that any of the 5 forms of psychological intervention (CBT, CRT, IPT, CAT and FPP) investigated was more efficacious than another.

2.5.2 Summary of the evidence base

BN Population

The reviewed studies consistently demonstrated that CBT is more efficacious than alternate forms of psychological therapy, namely, BT and SET. Although IPT was found to be as efficacious as CBT at one year follow up, CBT was significantly more efficacious than IPT at post-treatment. This suggests that CBT produces more rapid symptomatic change in BN than IPT. No evidence was found to suggest than CBT plus ERP was more efficacious than CBT. In terms of the mode of delivery of CBT, the results from 1 study indicate that individually tailored CBT may be more efficacious than manualized CBT.

SP was also found to significantly improve clinical outcome in BN but it was compared to CO which was found not to be an efficacious form of psychological intervention for this patient population.

All of the forms of psychological intervention investigated for efficacy in the BN population within the reviewed studies were found to significantly improve clinical outcome with the exception of CO.

AN Population

Very few studies have investigated the efficacy of alternate forms of individually delivered psychological interventions in the AN population. Only 3 studies met the a priori inclusion criteria adopted for this review. No significant differences were found across the clinical outcomes of the 5 forms of psychological intervention investigated for efficacy, namely CBT, CRT, IPT, CAT and FPP.

A tentative preliminary evidence base was found for the efficacy of psychological therapies for adults with AN in outpatient settings. The experimental results of the studies indicated that all of the 5 forms of psychological therapy studied improved clinical outcome in AN, however, there is currently insufficient research to enable conclusions regarding the best way to treat AN.

2.5.3 Shortcomings in the literature

It is difficult to establish conclusions regarding the optimal psychological interventions for BN and AN due to the limited number of published studies and the methodological difficulties within the reviewed literature.

One of the main shortcomings of the literature highlighted by the current review is the limited research conducted within this area. Consistent results from the relatively small number of studies of this nature conducted within the BN population indicated that CBT is more efficacious than other forms of psychological intervention and that IPT is as efficacious as CBT in the longer term. Of particular concern however, the current review found no evidence to suggest that any form of

psychological therapy for AN was more efficacious than an alternate form. Only 3 studies were found to meet the a priori inclusion criteria for this population.[25,28,30] The lack of current literature does not enable an understanding of the optimal psychological treatment for this population.

Methodological limitations in the published literature as well as the lack of research contribute to the difficulties defining the optimal psychological interventions. The majority of the studies omitted a power calculation[10,12,15,17,25,30,44] and an insufficient sample size of participants within treatment groups was recognised by a number of the authors,[12,18,28,30] thus reducing probability of detecting a statistically significant difference between groups. A further limitation regarding sample size is the observed high attrition rates. The Centre for Evidence Based Medicine (CEBM) document that greater than 20% attrition is indicative of a low quality RCT.[44] Seven out of the 11 included studies had higher attrition rates than 20%.[9,11,12,15,25,29,30] High attrition rates compromise the validity of the outcome data therefore limiting the ability to enhance the understanding of evidence based psychological treatment for this population.

The randomisation of participants into treatment groups enables establishment of a causal interpretation for the efficacy of treatment.[46] The majority of the reviewed studies were found to inadequately randomise or inadequately report the randomisation process of participants.[10-12,15,17,18,25,44] Following randomisation, the concealment of treatment allocation is important to eliminate selection bias and minimize confounding variables.[45] Previous research suggests that inadequate concealment methods result in larger estimates of treatment effects.[46] The majority of the included studies did not report a method of ensuring that the treatment

assignment sequence was concealed until the intervention was assigned.[9-12,15,17,18,25,30,44] These methodological weaknesses regarding the process of randomisation limit the robustness of the experimental findings of the majority of the included studies.

RCTs provide the best evidence for cause and effect interpretations as they enable researchers to manipulate one variable at a time.[48] Confounding variables, which limit the ability to infer a causal relationship, may still be present in RCTs if researchers do not control for them.[49] Concurrent psychological or pharmacological treatment is a confounding variable which reduces the ability to determine whether treatment outcome is due to the treatment under investigation or the concurrent form of treatment. Only 3 of studies included within the current review excluded both psychological and pharmacological concurrent treatment.[9,11,25] The remaining studies either did not exclude both psychological and pharmacological concurrent treatment or did not report this issue. It is therefore difficult to determine from these studies the extent to which the treatment under investigation is causing the treatment outcome.

2.5.4 Potential biases in the review process

There is the potential for publication bias due to the search being limited to published peer-reviewed journals.

A degree of caution should be exercised when interpreting the results due to the quality criteria not being validated. However, the potential for subjective bias in the analysis of the methodological quality of the studies was limited by having the studies independently rated. A high inter-rater reliability was demonstrated.

2.5.5 Implications for clinical practice

The findings of the current review indicate that CBT is the optimal form of individually delivered psychological intervention for BN in the short-term. CBT was found to reduce BN symptomology more rapidly than IPT, however, IPT was found to be as effective as CBT in the longer-term. These findings are consistent with the NICE Guidelines (NICE, 2004) and suggest that CBT and IPT should be routinely offered to patients presenting with BN in outpatient settings.

In relation to the AN population, the results of this review suggest that a range of psychological interventions, specifically CBT, CRT, IPT, CAT and FPP, should be considered when working with this patient group. Although all of the forms of psychological intervention investigated were found to be efficacious in this population, there was no evidence that any form was more efficacious than another. Subsequently an optimal form of psychological intervention for this patient population was unable to be determined. These findings are consistent with the NICE Guidelines that document that a number of psychological therapies should be considered in the treatment of this population.[3]

2.5.6 Implications for research

Further research is required to determine the efficacy of psychological therapies for adults with eating disorders, specifically BN and AN, in outpatient settings. This is particularly important for the AN population as currently the lack of research results in the inability to determine any form of optimal psychological

intervention for this population. A number of potential factors may explain the current limited published literature adopting RCT methodolology when examining the efficacy of alternate forms of psychological treatment in AN. A consequence of the low incidence rate of AN is the small number of potential research participants. Some individuals with AN demonstrate reluctance to seek treatment or accept help, therefore are unknown to healthcare services. High attrition rates in studies investigating treatment efficacy in AN are consistently documented within the literature which also reduces sample size.[50] Clinically significant co-morbid psychopathology and medical problems often accompany AN.[51] Higher rates of co-morbid psychopathology, including anxiety disorders, depression and obsessive compulsive disorder, have been documented in AN compared to BN.[52,53] These co-morbid conditions increase the vulnerability of this patient population which may limit the confidence of clinicians to recruit them to novel or limited evidence-based treatment studies. Further, the heterogeneity of patients with AN in type of co-morbid condition may contribute to variability in treatment outcomes. Pessimism regarding the potential for change in medical and psychological symptomology in individuals with AN and the perception that AN is untreatable by clinical staff has been documented within the literature.[51] These factors may reduce the priority of undertaking research adopting rigorous methodology with this patient population. The results of the current review demonstrate that robust treatment research needs to be prioritised in this patient population in order identify efficacious forms of psychological treatment to ultimately enhance the clinical outcome for patients.

Future studies in this area need to address the methodological difficulties outlined within this review. Researchers should utilise standardised diagnostic

criteria, employ a priori power calculations to justify sample size, adopt an adequate method of randomisation and concealment of treatment allocation, adequately "blind" assessors and exclude concurrent treatment. The adoption of rigorous methodology would enable the establishment of conclusive evidence for the optimal forms of psychological therapies for these patient populations.

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3. Main Journal Article

Title

A comparison of set-shifting ability in inpatients and outpatients with anorexia nervosa

Abbreviated Title

Set-shifting ability in anorexia nervosa

WORD COUNT: 4,968 (excluding abstract, references, tables and figures)

3.1 ABSTRACT

Objective: Impairments in set-shifting have been demonstrated in the anorexia nervosa (AN) population and it has been suggested that clinical severity may be associated with this deficit. Studies specifically investigating inpatients with anorexia nervosa (IAN) and outpatients with anorexia nervosa (OAN) are limited in number and to date no study has compared these two clinical groups. The current study aimed to compare set-shifting ability in IAN and OAN on a battery of specific tests and to examine the effect of body mass index (BMI) and medication on performance. **Method:** 25 IAN were compared with 20 OAN. All of the participants completed a neuropsychological battery of set-shifting tasks comprising of the Wisconsin Card Sorting Test, The Hayling and Brixton Test and the Delis-Kaplan Executive Function System subtests Trail Making, Verbal Fluency and Colour-Word Interference. **Results:** Both IAN and OAN demonstrated impaired set-shifting ability on all of the set-shifting tasks. No significant differences between IAN and OAN were found on any of the set-shifting tasks. BMI was not correlated with set-shifting ability and no relationship between psychotropic medication and performance on set-shifting tasks was found. **Discussion:** Clinical severity and the use of psychotropic medication are unable to account for the set-shifting deficit demonstrated in AN. The set-shifting impairment demonstrated by both IAN and OAN indicates that both patient populations may benefit from receiving psychological treatment to enhance set-shifting ability. An emerging body of research has found that Cognitive Remediation Therapy (CRT) reduces set-shifting difficulties in IAN and significantly increases

BMI. These experimental results provide evidence to suggest that further research investigating the efficacy of CRT in OAN is warranted.

Keywords: neuropsychology, cognition, cognitive impairment, cognitive flexibility, neuropsychological tests, eating disorders

3.2 INTRODUCTION

Anorexia nervosa (AN) is a complex disorder of unknown aetiology.[1] It is characterised by the refusal to maintain healthy body weight for height, poor perception of body image, a fear of extreme weight gain and, in females, amenorrhoea.[2] It is associated with medical and psychiatric co-morbidity[3] and has a high rate of chronicity.[4]

Currently, there is limited evidence for efficacious psychological treatments for AN.[5] National guidelines recommend that most patients with AN should be managed on an outpatient basis with psychological therapy but the level of evidence for this recommendation is at the lowest rating.[5] In terms of specific treatment recommendations for inpatients with AN, the NICE guidelines advocate the combination of re-feeding with physical monitoring and psychosocial interventions,[5] although it has been acknowledged that there is limited research evidence to guide this advice.[6] A greater understanding of the presentation of patients with AN is crucial in order to enhance the treatment provision and clinical outcomes for these patient populations.

It has been argued that an enhanced understanding of the neurobiological contributions to the development and presentation of AN is crucial in order to develop more efficacious treatments for this patient population.[1] Abnormalities in the structure of the brain and neural functioning have been evidenced by reduced hippocampal and grey matter volume.[7] Lambe et al (1997) found persistent grey matter volume reduction in weight-recovered AN compared to low-weight AN and a healthy control group which suggests that the abnormality may not be due to weight

loss or starvation alone.[8] Patients with AN have alterations in the medial prefrontal and anterior cingulate cortex[9] and abnormalities in the parietal and prefrontal cortical circuits.[10] These neural areas have been linked to deficits in the ability to shift behaviour.[11]

Investigation of neuropsychological functioning in AN is a relatively new research field. It does, however, have the potential to enhance the understanding of the clinical presentation of patients with AN and factors that may contribute to the maintenance of the disorder.[12] Neuropsychology is the scientific study of the relationship between brain functioning and behaviour using standardised measures of cognitive functioning.[13] Many aspects of cognitive functioning have been investigated in the AN population including general intelligence,[14] memory,[15] attention,[16] and visuospatial functioning.[17] However, researchers have argued that AN is not associated with a widespread pattern of cognitive deficits.[18] Instead it has been found that patients with AN demonstrate a specific deficit in the cognitive domain of set-shifting ability,[19] which is suggested to be the behavioural manifestation of the neural abnormalities that have been evidenced.[9,10]

Set-shifting is an integral component of cognitive and behavioural flexibility and is defined as the ability to adapt behaviour or thought processes in response to changing demands within the environment.[20] Patients with AN have been documented to clinically present with rigid and perfectionistic personalities, inflexible eating-related behaviours, difficulties assimilating treatment recommendations and rigid daily routines,[21] which are all behaviours associated with impairments in set-shifting. Set-shifting is operationalized in neuropsychological tasks that require participants to rapidly and accurately modify their behaviour in

response to changing task demands. A set-shifting impairment is highlighted by increased time to complete these tasks and excessive errors, in particular perseverative errors.[12]

Despite some conflicting results, there is increasing evidence to suggest that adults with AN demonstrate impairments in set-shifting. A systematic review of set-shifting ability in AN identified 15 published studies[19] utilising at least one of the following measures of set-shifting ability; Trail Making Test (TMT), Wisconsin Card Sort Test (WCST), Brixton Task, Haptic Illusion, CatBat task and the set-shifting subset of the Cambridge Neuropsychological Test Automated Battery (CANTAB). A consistent deficit on the set-shifting tasks was found, however, no difference in performance between the AN population and the healthy population was found on the CANTAB.[22] Further, although it was reported that consistent deficits were demonstrated by AN participants on the remainder of the tasks, Steinglass, Walsh and Stern (2006) did not find a set-shifting impairment on the Stroop Interference Sub-test and the Trail Making Tests A and B.[23] An updated literature review identified a further 8 studies,[21,24-30] 6 of which found set-shifting impairments in AN participants. Impaired set-shifting performance was demonstrated on the WCST,[21,25,26,28,30] the Iowa Gambling Task (IGT),[25,26,28] the Brixton Test,[27,30] the Trail Making Test,[28,30] the Haptic Illusion Task[30] and the Hayling Sentence Completion Test.[28] However, Fagundo et al (2012) found no impairment in set-shifting ability among AN participants as measured by the Stroop and Roberts et al (2010) demonstrated no set-shifting impairment on the Trail Making Task. The remaining 2 studies further evidenced no impairments in set-shifting on the IGT[29] or the Intra-Extra Dimensional Set Shifting Task in AN participants.[24]

It has been argued that the relationship between AN and set-shifting ability may be mediated by the consequences of starvation and brain atrophy.[31,32] Body mass index (BMI) is an indicator of nutritional status in adults.[33] Research investigating the relationship between set shifting ability and body mass index (BMI) in AN have yielded conflicting results. BMI has been found to be related to set-shifting ability in AN, as measured by the WCST[28] and the Trail Making Test B.[34] In contrast, other researchers have documented no association between BMI and impaired set-shifting ability in AN as measured by the WCST,[16,26,35] the Brixton,[27] the Modified Stroop[16] and the IGT.[29] Further examination of whether BMI is associated with set-shifting ability in AN is warranted.

Inpatient treatment is recommended within national treatment guidelines for patients with AN who are deemed to be at moderate or high physical risk.[5] The Royal College of Psychiatrists document that a BMI between 13 and 15 is indicative of medium risk and a BMI below 13 indicates high risk.[35] In general, the differentiation of inpatients with anorexia nervosa (IAN) and outpatients with anorexia nervosa (OAN) highlights a variation in nutritional status (BMI).[36] The majority of researchers investigating set-shifting ability in AN have either amalgamated inpatients with AN (IAN) and outpatients with AN (OAN) into the same AN participant group[23,27-29] or have not specified whether the AN participants were receiving inpatient or outpatient treatment at the time of participation in the study.[26,30] Therefore, there is currently a limited amount of published research specifically investigating set-shifting ability in IAN or OAN.

A set-shifting impairment has been demonstrated in the OAN population using the Stroop,[16] the WCST[16] and the CatBat Task[37] as neuropsychological

measures of set-shifting ability. In contrast, a range of additional set-shifting tasks have been utilised in the IAN population and inconsistent findings regarding performance have been reported. Impairment on the Trail Making B test, the Brixton Test, Picture Set Test, the Uznadze Illusion Task and the CatBat Task has been found in the IAN population.[31] However, further evidence suggests that IAN do not demonstrate set-shifting deficits on the CANTAB,[22] the WCST, the Object Alternation Test and the Weigl's Sorting Test.[38]

When comparing the results of set-shifting ability between IAN and OAN a potential difference can be seen. Although both IAN and OAN have been shown to demonstrate set-shifting impairments as measured by the CatBat Task, a set-shifting impairment on the WSCT has been demonstrated in OAN but not in IAN. Outwith these findings, there is a difficulty comparing experimental results between IAN and OAN. Researchers have administered either up to 2 neuropsychological measures of set-shifting[16,22] or have utilised a range of up to 6 tasks which have included tests that had not been adopted by other research groups.[31,37,38] This difference in the types of assessment administered, limits the ability to compare experimental findings. It therefore currently remains unclear whether set-shifting ability varies between OAN and IAN or whether the utilisation of varying types of neuropsychological set-shifting tasks explains the differences in research findings. A direct comparison of set-shifting ability, as measured by the same range of set-shifting tasks, in these specific patient populations is currently lacking within the literature.

Additional confounding variables may also account for the discrepancy in the research findings. Age was found to significantly differ between the IAN and the healthy control (HC) participants within the Cavedini et al (2004) study.[38] Increasing

age is associated with decline in cognitive abilities.[39] The HC group was significantly older than the IAN group, which may account for why no significant difference in performance was found on the set-shifting tasks. Medication may also have an effect on set-shifting performance in AN. Psychotropic medication is documented to have a negative effect on cognitive functioning.[40] Both anti-depressant medication, specifically selective serotonergic reuptake inhibitors (SSRIs)[41] and anxiolytic medication, specifically, benzodiazepines, have been found to reduce set-shifting ability.[42] None of the studies specifically investigating set-shifting ability in IAN or OAN have taken into account medication.[16,22,31,37,38] The studies have not reported whether the participants were receiving concurrent pharmacological intervention at the time of participation within the research study or what forms of medication were being taken. Further research is required to address these methodological difficulties.

3.2.1 Summary and Research Aims

Patients with AN have a poor prognosis and it is therefore crucial to gain an enhanced understanding of the clinical presentation and the potential maintenance factors of the disorder. It is widely accepted that neuropsychological research has the potential to advance the understanding of AN at a clinical and theoretical level. Despite some conflicting results, set-shifting is the most consistently reported cognitive deficit associated with AN. To date, no study has compared set-shifting in OAN and IAN. The current study aims to address this gap in the research and to enhance the literature by utilising more rigorous research methodology in the form of employing a range of neuropsychological measures of set-shifting with the same

cohort of participants. The main aim of the study was to investigate set-shifting ability in AN as measured using a range of neuropsychological assessments, specifically comparing IAN and OAN performance. Further, the study aims to examine whether BMI is associated with set-shifting ability in AN and whether medication is related to performance on set-sifting tasks. Research in this area may lead to significant developments in the management of both IAN and OAN and enhance the clinical outcomes for patients.

3.3 METHOD

3.3.1 Ethical Approval

The study was designed in accordance with the Declaration of Helsinki.[43] Ethical approval was granted by both the local area NHS Research Ethics Committee and the private sector inpatient unit (Appendices 2 and 3). The local area NHS Research and Development Office also approved the study prior to commencement (Appendix 4).

3.3.2 Participants

Of the 27 inpatients with AN (IAN) approached to participate in the study, 25 opted to take part (92.6%) and of the 21 outpatients with AN (OAN) approached, 20 participated (95.2%). Within the IAN group, 21 (84%) patients met criteria for AN and 4 (16%) for Atypical AN. Within the OAN group, 13 (65%) patients satisfied criteria for AN and 7 (35%) for Atypical AN.

Inclusion criteria for the study comprised: (1) receiving treatment on an inpatient basis at Priory Hospital Glasgow or an outpatient basis at either NHS Tayside Eating Disorders Service or Priory Hospital Glasgow; (2) diagnosis of AN or atypical AN according to ICD-10; (3) deemed medically stable by clinical staff; (4) spoke English as a first language; (5) female; (6) aged between 18 and 65 years.

Exclusion criteria consisted of: (1) a history of a learning disability, developmental disorder, head injury involving loss of consciousness or neurological

disorder; (2) current psychosis; (3) acute psychological distress or co-morbidity; (4) current uncorrected significant motor or visual impairment; (5) history of substance misuse; (6) knowledge of neuropsychological assessments in the form of undergoing or administering the assessment.

3.3.3 Recruitment and Procedure

Patients were recruited consecutively from the respective recruitment sites and the research procedure was the same for both groups of participants. Clinical staff within the recruitment sites approached patients who, in their clinical opinion, were medically fit and without acute psychological distress or co-morbidity. Patients who expressed an interest in participating were provided with verbal and written information regarding the procedure of the study by their treating clinician. If the patient consented, their contact details were given to the lead investigator who contacted them to discuss the study further. Patients who agreed to participate were then asked to meet with the lead investigator to provide written informed consent prior to commencing the assessment (Appendices 5 and 6). The assessment involved a semi-structured interview to collect demographic information, a questionnaire regarding eating psychopathology and a formal neuropsychological assessment. The assessment lasted between 60 and 120 minutes and the measures were undertaken in the same order with all of the participants. Breaks were offered to participants in order to reduce the potential impact of fatigue.

3.3.4 Measures

The following measures were undertaken with each participant. They are presented in the order that they were administered.

Eating Psychopathology

Eating Disorders Examination – Questionnaire[44] (EDE-Q)

The EDE - Q is a self-report questionnaire designed to assess the severity of dietary restraint and concerns about eating, shape and weight over the preceding 28 days. It is regarded as the "gold standard" clinical assessment for AN and bulimia nervosa.[45] Good inter-rater reliability, internal consistency and validity have been consistently documented.[46]

Intellectual Functioning

National Adult Reading Test[47] (NART)

The NART is a reading list of 50 irregularly spelt words in order of increasing difficulty designed to measure premorbid intellectual ability. A strong correlation between IQ and reading ability has been well documented.[48] The participant is presented with a word card and asked to pronounce each word aloud. Research suggests that the NART estimated IQ is significantly correlated with age, education and social class.[49] Good test-retest reliability,[49] inter-rater reliability,[50] and internal consistency[47,49] have all been reported within the literature.

Set-shifting Ability

Wisconsin Card Sorting Test[51] (WCST)

The WCST is a measure of an individual's ability to form abstract concepts, develop and maintain set and to utilise feedback to shift set. The test consists of 4 stimulus cards and 128 response cards depicting figures of varying form, colour and number. The participant is asked to match each consecutive response card with one of the four stimulus cards and informed whether each response is correct or incorrect. When the participant has made a specified number of consecutive correct responses, the sorting principle is changed without warning. The participant is required to use the feedback provided to develop a new sorting strategy. The number of perseverative responses and errors made is indicative of set-shifting ability. Moderate sensitivity and moderate ecological validity have been documented.[52]

Hayling Sentence Completion Test[53]

The Hayling Sentence Completion Test is a measure of initiation and suppression. It consists of 2 sets of 15 sentences, each with the last word missing. In part 1 the examiner reads aloud each sentence and asks the participant to complete the sentence as quickly and as accurately as possible. In part 2 the examiner reads aloud each sentence and asks the participant to complete the sentence with an entirely unconnected word as quickly and as accurately as possible. This requires the participant to inhibit the expected response. The number of errors made on this task provides an indication of set-shifting ability. Moderate sensitivity and moderate specificity[53] and modest ecological validity have been documented.[54]

Brixton Spatial Anticipation Test[53]

The Brixton Spatial Anticipation Test is a measure of rule attainment and response flexibility. It consists of a 52-page booklet containing 10 circles in the same grid format on each page. One of the circles is coloured blue, the position of which changes on each page. A series of rules, which change without warning, govern the change in position. The participant is asked to determine the rule to the apparent movement of the blue circle. The number of errors made on this task indicates set-shifting ability. Moderate sensitivity, moderate specificity[53] and modest ecological validity have been demonstrated.[54]

Delis-Kaplan Executive Function System[55]

The Delis-Kaplan Executive Function System is a standardised assessment of executive functioning comprising of 9 subtests. Three of these subtests specifically measure set-shifting: trail making test, verbal fluency and colour-word interference: (1) The Trail Making Subtest is a measure of set-shifting, which is assessed by a number-letter switching task. The time taken to complete the task and the number of errors made indicate set-shifting ability; (2) The verbal fluency category switching condition involves generating words and alternating between two different semantic categories (fruits and furniture). Category switch accuracy and the number of errors measure set-shifting ability; (3) Condition 4 of the colour-word interference subtest measures inhibition and set-shifting by asking the participant to switch between reading the words and naming the dissonant ink colours. The time taken to complete the task and the number of errors made indicate set-shifting ability. Good test-retest

reliability, good internal consistency and validity have been documented for each of these subtests.[56]

3.3.5 Power Calculation

The sample size for the study was determined following a power calculation and statistical advice. A recent meta-analysis[19] indicated that the effect size of set-shifting impairments in individuals with anorexia nervosa on neuropsychological measures was medium. Power calculations using G*Power suggested analysis consisting of independent samples t-tests calculated for a medium effect size (d = 0.5) at power 0.8 with alpha level of 0.05 required 51 participants per group. Of the 15 studies included in the Roberts et al[19] meta-analysis, the sample size per group ranged between 10 to 47 with a mean of 24. The current study aimed to recruit 24 participants per group.

3.3.6 Statistical Analyses

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 17. In order to examine the demographic and clinical characteristics of both the IAN and OAN participants, a descriptive analysis was undertaken. Independent samples t-tests were used to investigate set-shifting ability in AN, specifically comparing IAN and OAN performance. A bivariate correlational analysis was undertaken to examine the relationship between BMI and set-shifting ability in AN.

Independent samples t-tests were used to investigate the effect of psychotropic medication on set-shifting ability in IAN and OAN.

3.4 RESULTS

3.4.1 Demographic and Clinical Data

Descriptive demographic and clinical characteristics are presented in Table 3.1. The age of the IAN group ranged from 19 to 57 years and for the OAN group from 18 to 47 years.

A statistically significant difference was found between the IAN and the OAN in BMI. BMI in the IAN group was significantly lower than the OAN group ($p < 0.05$). No significant differences on any of the other demographic or clinical variables were found.

Table 3.1. Demographic and clinical characteristics

	IAN (N = 25)		OAN (N = 20)		p
	M	**SD**	**M**	**SD**	
Age	29	8.9	26.5	9.3	.370
BMI (kg/m^2)	14.8	2.3	17.2	2.6	.002*
Age AN onset	17.6	5.9	16.9	3.5	.642
Duration of AN (years)	11.4	8.5	8.6	8.7	.293
EDE-Q Global	4.6	1.1	4.6	1.1	.956
Education (years)	15.6	1.7	12.7	6.9	.079
NART Estimated IQ	115.6	5.1	116.2	4.6	.659

Note. AN = Anorexia Nervosa; IAN = Inpatient Anorexia Nervosa Group; OAN = Outpatient Anorexia Nervosa Group; BMI = Body Mass Index; EDE-Q = Eating Disorders Examination – Questionnaire; NART = National Average Reading Test; IQ = Intelligence Quotient

* $p < 0.01$

3.4.2 Set-shifting Performance

The mean scores and group comparisons for the set-shifting measures are presented in Table 3.2. No significant difference in performance between groups was found on any of the set-shifting tasks ($p < 0.05$).

Comparing set-shifting performance to age and estimated level of intellectual ability norms (as determined by the NART estimated IQ), the mean score for the IAN group was at least 1 standard deviation below the expected range on all of the set-shifting tasks, with the exceptions of the HSCT and the BSAT which were 2 standard deviations below the expected range. In relation to the OAN group, the mean score was at least 1 standard deviation below the expected range on all of the set-shifting tasks, with the exception of the DKEFS colour-word inhibition switching subtest, the HSCT and the BSAT which were at least 2 standard deviations below the expected range.

Table 3.2 Performance on set-shifting tasks

	Normative Data*	IAN (N = 25)		OAN (N = 20)		p
		M	SD	M	SD	
WCST						
Perseverative responses	8.8	13.6	11.4	11.1	10.3	.457
Perseverative errors	8.2	12	8.9	9.7	8.2	.380
HSCT						
Total errors	0	1.8	3.1	3.7	3.9	.078
BSAT						
Total errors	8	12.8	5.3	13.6	6.1	.642
DKEFS						
CW Inhibition switch time	40	66.1	23.1	68.4	17.9	.708
CW Inhibition switch errors	0	2.8	3.7	2.2	3.1	.601
TM Number/letter switch time	36	66.8	25.5	72.6	29.1	.483
TM Error score	0	1.1	1.5	1.0	1.2	.895
VF Category switch accuracy	16	7.1	3.7	8.0	3.2	.363

VF Category switch total correct	17	11.4	2.9	11.2	3.3	.872

Note. IAN = Inpatient Anorexia Nervosa group; OAN = Outpatient Anorexia Nervosa group; WCST = Wisconsin Card Sorting Test; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making CW = Colour-Word Interference VF = Verbal Fluency

* Cut-off normative scores for healthy individuals with a High Average IQ

3.4.3 Relationship between set-shifting ability and BMI

Preliminary analysis revealed that the clinical variable BMI significantly differed between the two participant groups. A bivariate correlational analysis was undertaken to investigate the relationship between BMI and set-shifting ability in AN; the results of this analysis are presented in Table 3.3. There was no significant correlation between BMI and performance on any of the measures of set-shifting ability.

Table 3.3. Relationship between BMI and set-shifting ability

	BMI (kg/m^2)	
	r	**p**
WCST		
Perseverative responses	.126	.415
Perseverative errors	.120	.437
HSCT		
Total errors	.111	.466
BSAT		
Total errors	.089	.566
DKEFS		
CW Inhibition switch time	.132	.389
CW Inhibition switch errors	.124	.693
TM Number/letter switch time	.018	.905
TM Error score	.043	.777
VF Category switch accuracy	.021	.872
VF Category switch total correct	.059	.700

Note. WCST = Wisconsin Card Sorting Test; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making subtest; CW = Colour-Word Interference subtest; VF = Verbal Fluency subtest

3.4.4 Effect of psychotropic medication on set-shifting ability

IAN

Thirteen of the 25 IAN were taking psychotropic medication; 7 were taking anti-depressant medication (selective serotonergic reuptake inhibitors (SSRIs)), 1 was taking anxiolytic medication (benzodiazepine), 4 were taking both SSRI and benzodiazepine medication and 1 was taking benzodiazepine and anti-psychotic medication.

The mean scores and group comparisons for the set-shifting measures are presented in Table 3.4. No significant difference in performance between groups was found on any of the set-shifting tasks ($p < 0.05$).

Table 3.4. Effect of psychotropic medication on IAN set-shifting performance

	Normative Data*	*Medication* (N = 13)		*No Medication* (N = 12)		p
		M	SD	M	SD	
WCST						
Perseverative responses	8.8	17.1	12.9	10.1	8.9	.136
Perseverative errors	8.2	14.7	9.5	9.2	7.6	.132
HSCT						
Total errors	0	0.8	1.5	2.8	4.1	.115
BSAT						
Total errors	8	11.7	4.1	13.9	6.3	.313
DKEFS						
CW Inhibition switch time	40	67.5	23.9	64.6	23.1	.763
CW Inhibition switch errors	0	3.1	4.5	2.5	3.0	.710
TM Number/letter switch time	36	69.9	24.6	63.6	27.1	.547
TM Error score	0	1.3	1.6	0.9	1.4	.521
VF Category switch accuracy	16	11.4	3.4	11.4	2.8	.980

VF Category switch total correct	17	14.5	2.7	15.0	2.2	.646

Note. IAN = Inpatient Anorexia Nervosa group; OAN = Outpatient Anorexia Nervosa group; WCST = Wisconsin Card Sorting Test; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making CW = Colour-Word Interference VF = Verbal Fluency

* Cut-off normative scores for healthy individuals with a High Average IQ

Twelve of the 20 OAN were taking psychotropic medication; 9 were taking anti-depressant medication (SSRIs), 2 were taking anxiolytic medication (benzodiazepine) and 1 was taking both SSRI and benzodiazepine medication.

The mean scores and group comparisons for the set-shifting measures are presented in Table 3.5. No significant difference in performance between groups was found on any of the set-shifting tasks ($p > 0.05$).

Table 3.5. Effect of psychotropic medication on OAN set-shifting performance

	Normative Data*	*Medication* (N = 12)		*No Medication* (N = 8)		p
		M	SD	M	SD	
WCST						
Perseverative responses	8.8	12.8	12.6	8.5	5.3	.372
Perseverative errors	8.2	10.9	9.9	7.9	4.5	.429
HSCT						
Total errors	0	3.6	3.6	3.9	4.6	.876
BSAT						
Total errors	8	12.5	4.8	15.2	7.8	.337
DKEFS						
CW Inhibition switch time	40	66.6	15.9	71.2	21.4	.593
CW Inhibition switch errors	0	2.00	1.9	2.6	4.5	.672
TM Number/letter switch time	36	68.6	21.1	78.5	39.2	.470
TM Error score	0	1.2	1.3	0.9	1.0	.605
VF Category switch accuracy	16	12.2	4.0	11.2	2.0	.561

VF Category switch total correct	17	14.8	3.2	14.2	2.5	.671

Note. IAN = Inpatient Anorexia Nervosa group; OAN = Outpatient Anorexia Nervosa group; WCST = Wisconsin Card Sorting Test; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making CW = Colour-Word Interference VF = Verbal Fluency

* Cut-off normative scores for healthy individuals with a High Average IQ

3.5 DISCUSSION

The results of this study support previous research demonstrating that patients with AN have impaired set-shifting ability.[16,21,23,26-28,30,31,37,38] Impairments in set-shifting performance were found on all of the neuropsychological measures. There were no differences in performance between participants who were taking psychotropic medication and participants who were not. Psychotropic medication is therefore unable to account for the deficit in set-shifting performance. This provides further behavioural affirmation of the neuroimaging evidence which demonstrates alterations in the medial prefrontal and anterior cingulate cortex[9] and abnormalities in the parietal and prefrontal cortical circuits[10] which are areas that have been linked to deficits in the ability to shift behaviour.

To the author's knowledge, the current study is the first to specifically compare set-shifting ability in IAN and OAN using a more comprehensive range of neuropsychological assessments. The findings demonstrate no significant difference in the set-shifting ability of IAN and OAN. The results support previous work suggesting that OAN have a set-shifting deficit.[16,37] In relation to IAN, the results support the evidence which suggests that IAN do present with set-shifting impairments,[31] however, conflict with a study which found no set-shifting impairments in this population.[38] Differences in the forms of neuropsychological assessment undertaken to measure set-shifting ability and presenting co-morbidity may explain the discrepancy in the research findings between the studies investigating the IAN population.

No relationship between set-shifting ability and BMI was found. Although this experimental result conflicts with findings of two studies which suggested that BMI is associated with set-shifting ability in AN,[16,37] it is consistent with the findings of the majority of the research which has not found an association.[16,23,26,27,29] The current study can be seen to add to the evidence which suggests that impaired set-shifting ability in AN is a trait rather than a state characteristic.[31,57] Theoretical research studies have argued that deficits in set-shifting may exist prior to the onset of AN[58] and may be a predisposing variable for the disorder.[23,59] Empirical research has demonstrated that unaffected sisters[30,57] and unaffected wider family members[25] of patients with AN demonstrate impaired set-shifting ability, adding further evidence for set-shifting ability being a cognitive endophenotype for the disorder.

3.5.1 Strengths

This study is the first to directly compare the performance of IAN and OAN on a range of neuropsychological measures of set-shifting. There are currently no specific forms of psychological treatment recommended for IAN in the NICE guidelines and a limited evidence base for psychological interventions for OAN.[5] The current study provides an enhanced understanding of a potential maintenance factor for both of these patient populations.

A key strength of the current study is that the experimental methodology was more rigorous than previous research in this area. A range of neuropsychological measures was utilised with the same cohort of participants. Previous research specifically investigating set-shifting ability in IAN or OAN administered either only

2 neuropsychological measures of set-shifting[16] or utilised a range of up to 6 tasks which included tests that had not been adopted by other research groups.[31,37,38] This difference in the utilisation of test measures limits the ability to compare experimental findings.

3.5.2 Limitations

A limitation of the current study is that it utilised a cross-sectional design, which does not enable the understanding of causality. This is the same methodological limitation of previous literature in this field which has also adopted this experimental design. Another limitation was that the researcher was not blind to the participant group due to differences in the clinical setting in which the assessment procedure was undertaken. However, the research procedure was standardised in order to reduce potential biases.

3.5.3 Clinical Implications

The presence of set-shifting impairments in both IAN and OAN suggest that patients with AN may have difficulties engaging in psychological therapy. Cognitive Behavioural Therapy (CBT) is the most researched form of psychological intervention recommended in national treatment guidelines.[5] CBT is a structured and collaborative therapy.[60] It aims to make connections between thinking, emotions, behaviour and physiology explicit to individuals through the use of behavioural experiments and guided discovery. The therapeutic goal is to systematically change

behaviour patterns and underlying beliefs. Modifying beliefs and behaviour requires attention, concentration and cognitive flexibility.[61] Both IAN and OAN may benefit from receiving treatment to address the suggested set-shifting impairment in order to enhance clinical outcome.

There is currently an emerging but small evidence base for Cognitive Remediation Therapy (CRT) in IAN. CRT was designed by Delahunty, Morice and Frost in 1993 to improve cognitive flexibility, memory and planning skills through the use of mental exercises (tasks that involve switching attention and estimating), reflection on thinking styles and exploring new ways of thinking in everyday life.[62] Results from case studies have demonstrated a significant improvement in set-shifting ability and a significant increase in BMI following CRT in IAN.[63-65] Qualitative research conducted by Whitney et al. (2008) indicated that patients thought that CRT was valuable and helped them to break rigid behaviours.[66] Further, patients were reported to have viewed CRT as being less intense than other therapies, which increased their engagement in the therapeutic process. The results of the current study suggest that OAN may also benefit from this form of treatment.

3.5.4 Research Implications

Currently, treating clinicians are unable to determine any form of optimal psychological intervention for IAN due to a limited evidence-base. It has been highlighted that, due to AN being a life-threatening condition, recruitment of some patients into treatment studies is unethical.[5] This may be the main reason why researchers have not attempted to conduct psychological treatment randomised

controlled trials (RCTs) with IAN. However, IAN who are deemed to be medically stable may benefit from participation in RCTs and the results of this research would have the potential to significantly enhance the treatment provision and clinical outcome for this patient population.

The results of the current study provide evidence to suggest that further research investigating the efficacy of CRT in OAN is warranted. To date, only 2 published studies have investigated the use of CRT in OAN[67,68]. The results provide preliminary evidence to suggest that CRT may be an effective treatment in OAN. CRT for OAN has the potential to enhance the physical and psychological well being of patients with AN and reduce the need for inpatient admissions. Although it has been suggested that CRT may be a useful preliminary psychological treatment for AN,[64] further studies could investigate the differential change in the response profile of the neuropsychological measures and the psychological measures across CRT and CBT. This would enhance the understanding of the mechanisms of clinical change in this patient population.

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4. Secondary Journal Article

Title

A comparison of Cognitive Remediation Therapy and Cognitive Behavioural Therapy in anorexia nervosa: A pilot randomised controlled trial

Abbreviated title

The efficacy of Cognitive Remediation Therapy in anorexia nervosa

WORD COUNT: 5,657 (excluding abstract, references, tables and figures)

4.1 ABSTRACT

Objective: AN (anorexia nervosa) is a serious psychiatric disorder with a poor prognosis. It is crucial to develop our understanding of efficacious forms of treatment for this condition. This pilot study utilised randomised control methodology to compare the efficacy of Cognitive Remediation Therapy (CRT) and Cognitive Behavioural Therapy (CBT) for AN and investigate the differential change in the response profiles of neuropsychological functioning and eating psychopathology across these treatments. **Method:** 11 participants were randomly allocated to receive 6 sessions of either CRT or CBT. Pre and post treatment assessments were conducted. Psychological measures comprised of the Eating Disorders Examination Questionnaire (EDE-Q), the Hospital Anxiety and Depression Scale (HADS) and the Obsessive Compulsive Inventory (OCI). Neuropsychological tasks consisted of the Wisconsin Card Sorting Test (WCST), the Brixton Spatial Anticipation Test (BSAT), the Hayling Sentence Completion Test (HSCT) and subtests of the Delis-Kaplan Executive Function System (DKEFS). **Results:** Statistically significant Time effects for the DKEFS set-shifting sub tests colour word interference, trail making and verbal fluency and the OCI measure of obsessive-compulsive symptomology were detected. A statistically significant Time X Group interaction effect was detected on the BSAT, with CRT being the superior form of therapy. **Discussion:** The results provide tentative evidence to support the effectiveness of CRT in AN, which warrant further investigation in a larger scale study. Sufficient power would enable more conclusive findings regarding the efficacy of CRT in AN.

Keywords: anorexia nervosa; cognitive remediation therapy; cognitive behavioural therapy; randomised controlled trial; psychological treatment; psychological intervention

4.2 INTRODUCTION

Anorexia nervosa (AN) is a serious mental health disorder characterised by an extreme fear of weight gain, an inability to maintain healthy body weight for height, an impairment in the perception of body image and, in females, amenorrhoea.[1] The incidence of AN is estimated to be 8.1 per 100,000 individuals per annum[2] and the disorder has the highest mortality rate of all psychiatric disorders.[3] A recent review found that less than half of individuals with AN recover from the illness[4] and when recovery occurs it is protracted and commonly follows a fluctuating course.[5]

Research investigating treatment interventions for AN is sparse and a range of barriers to treatment research in this population has been outlined.[6] These include the low incidence of the disorder, the heterogeneity of the patient population in relation to clinical variables and age, clinically significant psychiatric and medical co morbidities and a lack of understanding of efficacious forms of treatment.[7] The limited evidence has informed national treatment guidelines which state that most patients with AN should be managed on an outpatient basis and that psychological therapy is a crucial component of treatment.[8] The guidelines outline a range of psychological treatments which are all at the lowest evidence base rating. These consist of Cognitive Behavioural Therapy (CBT), Cognitive Analytic Therapy (CAT), Interpersonal Psychotherapy (IPT), focal psychodynamic therapy and family therapy but an optimal form of treatment has not been advised. In order to rectify this, researchers have recommended pilot studies investigating novel treatment

approaches for AN as well as further investigation of more evidence-based approaches.[7]

CBT is the most researched form of psychological treatment recommended within national treatment guidance for AN.[8] It is a structured form of therapy which utilises behavioural experiments and guided discovery to make connections between thinking, emotions, behaviour and physiology explicit.[9] The therapeutic goal of CBT is to identify, challenge and modify behaviour patterns and underlying beliefs. A systematic review of treatment for adults with AN identified 6 published randomised controlled trials (RCT) investigating the efficacy of psychological therapies. Five of these trials were with an outpatient population and in 3 of these CBT was used.[10] An updated literature review found 1 further RCT investigating the efficacy of CBT in outpatients with AN.[11] The results of the 4 identified studies provide tentative evidence for the efficacy of CBT in AN. CBT has been found to significantly improve weight[12] and menstrual functioning[12] and reduce eating restraint[13] and the drive for thinness.[12] Additionally there is limited evidence to suggest that CBT reduces the rate of relapse in this patient population when compared to other forms of psychological therapy.[14]

Clinically, patients with AN present with obsessive traits, perfectionistic and rigid personalities and inflexibility in relation to eating-related behaviours and daily routines.[15] Empirical research investigating the neuropsychological correlates of AN demonstrates impairments in set-shifting.[15] Set-shifting is the ability to adapt thought processes and/or behaviour in response to changes in environmental demands.[16] This impairment has been demonstrated on a range of measures including the Trail Making Test (TMT),[17] Wisconsin Card Sort Test (WCST),[18] the Stroop Interference

subtest, Brixton Spatial Anticipation Task (BSAT), Hayling Sentence Completion Task (HSCT)[17] and the CatBat task.[15] Until recently, it was unclear whether set-shifting ability differed between inpatients with AN (IAN) and outpatients with AN (OAN). However, when compared on a range of set-shifting tasks comprising of the WCST, the Delis-Kaplin Executive Function System subtests of Colour Word Interference, Trail Making and Verbal Fluency, the BSAT and the HSCT, both IAN and OAN have been found to demonstrate impairments in set-shifting with no significant difference in degree of impairment between the groups.[19] Impairments in set-shifting are likely to negatively impact the ability to modify beliefs and behaviour which are fundamental components of CBT.[20]

Preliminary research has suggested that Cognitive Remediation Therapy (CRT), a form of psychological treatment that acts by improving cognitive flexibility, may be efficacious in IAN. Delahunty, Morice and Frost (1993) initially designed CRT for individuals with schizophrenia to improve cognitive flexibility, memory and planning skills through the use of cognitive exercises.[21] The therapy encourages thinking about thought processes, reflecting on thinking styles and exploring new transferable thinking strategies, with a focus on the processes of thought rather than the content. More recently the original CRT module was adapted for use with individuals with AN.[22] A number of published case studies have found that CRT improves cognitive flexibility in IAN.[23-25] Further, Tchanturia et al. (2008) found a significant increase in BMI and decrease in depression post-treatment.[23] Qualitative research indicates that individuals with AN find CRT valuable as it helps them to understand and modify their rigid behaviours.[26] It has been argued that CRT

may be more accessible for individuals with AN as it does not specifically address the presenting symptoms of the eating disorder.[27]

To the authors' knowledge, although set-shifting impairments have been found in both IAN and OAN, only 2 published studies have investigated the use of CRT in OAN. The first was an open trial which recruited 20 adult participants with AN.[28] It reported significant improvements on the WCST and the Trail Making Test A set-shifting task as well as a significant increase in BMI post CRT.[28] In contrast, no significant difference in performance was found pre and post treatment on the Iowa Gambling Task, Trail Making Test B and the HSCT and no change on a measure of depression was demonstrated. The researchers only included participants with restricting subtype AN, which reduces the ability to generalise the results to the AN population as a whole. The second was an RCT published which primarily aimed to examine whether CRT reduced attrition in outpatient treatment.[29] Forty six participants were randomly allocated to receive either 8 sessions of CRT followed by 16 sessions of CBT or 24 weeks of CBT. The authors concluded that CRT may reduce attrition in the short term. Cognitive flexibility, as measured by the WCST, the Delis Kaplin Executive Function System (DKEFS) subtests colour word interference, verbal fluency, trail making and towers and the Rey-Osterrieth Complex Figure (RCF) and BMI were assessed pre and post the initial 8 sessions of treatment for both groups, allowing for a direct comparison of the effects of CRT and CBT on these variables. Significant treatment effects on the DKEFS colour-word interference subtest and the RCF were found, with CRT being the superior form of therapy. Both forms of therapy were found to significantly increase BMI, however, there was no significant difference between CRT and CBT. The researchers did not

include a measure of eating psychopathology following the initial 8 weeks of treatment. This did not enable the differential profile of CRT and CBT on eating psychopathology be examined over this treatment period. However, these variables were assessed pre and post the 24 treatment period for both groups, primarily to enable the comparison of CRT and CBT versus CBT in reducing participant driven drop out of treatment. It is unclear from the paper whether intention to treat analysis or completer analysis was undertaken. A further limitation of the study is that it included adolescent participants under the age of 16, which reportedly breached the study inclusion criteria.

Although, these studies provide preliminary evidence to suggest that CRT may be an efficacious form of psychological treatment for OAN, the current literature does not enable the understanding of the specific effects of CRT. To date, no study has examined the differential change in the response profile of neuropsychological measures and eating psychopathology measures across a direct comparison of CRT versus CBT. The current pilot study aims to address these gaps in the literature.

4.2.1 Summary and research aims

AN is a serious psychiatric disorder with a poor prognosis. It is crucial to develop our understanding of efficacious forms of treatment for this patient population. Currently, treatment research in AN is sparse and, as a result, the evidence-base for psychological treatment is limited. Within the literature, CBT is the most researched form of psychological therapy and there is tentative evidence to

suggest that it is efficacious in this patient population. It has been argued, however, that the impairment in set-shifting demonstrated by this patient population may reduce the effectiveness of psychological treatments. There is preliminary evidence to suggest that CRT, a therapy aimed at improving set-shifting ability, is efficacious in the treatment of AN. It has been found to improve set-shifting ability and increase BMI. However, an understanding of the specific effects of CRT versus CBT on both neuropsychological and eating psychopathology cannot be derived from the current literature. Building on the current literature base, the study is a pilot of a larger study, which utilised randomised control methodology to compare the efficacy of CRT and CBT for OAN and investigate the differential change in the response profiles of neuropsychological functioning and psychological functioning across these treatments.

4.3 METHOD

4.3.1 Ethical Approval

The study was registered on a public database in accordance with Article 19 of the World Medical Association Declaration of Helsinki (2008) (ISRCTN79119671).[31] Ethical approval was granted by both the local area NHS Research Ethics Committee and the private sector inpatient unit (Appendices 7 and 8). The local area NHS Research and Development Office also approved the study prior to commencement (Appendix 9). The local area NHS Board agreed to act as a sponsor and as such indemnity for the study was provided through the NHS Indemnity Scheme (Appendix 10).

4.3.2 Design

The pilot study compared the efficacy of 2 different forms of psychological treatment for AN: CRT focusing on improving cognitive skills and CBT focusing on identifying and challenging cognitions, emotions and behaviours. A randomised controlled trial was conducted which utilised a 2 (Time: pre treatment, post treatment) X 2 (Treatment Groups: CRT, CBT), mixed groups design. Randomisation into treatment groups was undertaken using a computer-generated schedule. The allocation sequence was concealed in sequentially numbered sealed envelopes from the researcher (MC) assessing participants. Corresponding envelopes

were only opened after each recruited participant had completed all of the pre treatment assessments.

4.3.3 Participants and Procedure

Inclusion/Exclusion Criteria

The inclusion criteria for the study consisted of: (1) meeting ICD-10 criteria for a diagnosis of anorexia nervosa or atypical anorexia nervosa; (2) receiving outpatient treatment within either NHS Tayside Eating Disorders Service or Priory Hospital, Glasgow; (3) aged 18-65 years; (4) female; (5) English as a first language.

Exclusion criteria consisted of: (1) deemed by clinical staff to be too emotionally or physically frail to participate; (2) current psychosis; (3) learning disability or developmental disorder; (4) history of head injury involving loss of consciousness; (5) history of or current neurological disorder; (6) uncorrected significant visual or motor impairment; (7) current or previous substance misuse; (8) knowledge of neuropsychological measures.

Procedure

All patients referred to NHS Tayside Eating Disorders Service and Priory Hospital Glasgow for psychological treatment for AN between June 2012 and February 2013 were eligible for participation. Following referral to the respective service, clinical staff conducted semi-structured interviews with patients to ascertain

presenting condition, demographic information and suitability for inclusion in the study. Patients meeting the inclusion criteria for participation were provided with a participant information sheet and, if they verbally agreed to participate, were asked to provide contacts details for the researcher (MC) to contact them. Following this, MC contacted patients who had agreed to participate to arrange an appointment to obtain written consent and conduct a blind pre-assessment (Appendices 11 and 12). Following this assessment, MC opened the sealed envelope which contained the randomly assigned allocated treatment for the participant. The researcher (MC) was not blind in relation to treatment group at the post-treatment assessment.

4.3.4 Treatments

The treatments were delivered on an outpatient basis. Participants within each treatment group received 6 sessions conducted over a period of up to 12 weeks. Eight sessions of CRT were administered in the previous RCT investigating the use of CRT in AN.[29] Wilson et al. (2002) investigated the time course of clinical change of CBT in eating disorders and found that the majority (62%) of post treatment improvement was evident by session 6.[31]

Each treatment session lasted 60 minutes. None of the participants were receiving concurrent forms of psychotherapy. One of the participants was receiving concurrent psychotropic medication in the form of Fluoxetine. The psychotropic medication had been taken in a stable manner for over 6 months prior to participation and continued to be stable over the treatment phase of the study. The therapists (PC, BG, LH, EP) were all experienced in the treatment of eating disorders and consisted

of a Consultant Clinical Psychologist, a Clinical Psychologist and 2 Specialist Psychotherapists. Each therapist conducted both forms of treatment. Treatment protocols were developed for both forms of treatment. Treatment fidelity was checked during supervision that occurred on a fortnightly basis for each therapist.

Cognitive Remediation Therapy (CRT)

The CRT protocol (Appendix 13) was developed based on the CRT module for AN developed by Davies and Tchanturia (2005).[22] Eating psychopathology, weight, shape and eating behaviour are not directly addressed by CRT. Instead, CRT involves the use of central coherence tasks and set-shifting tasks, which aim to improve cognitive flexibility. Eleven of the tasks within the original treatment manual were highlighted by the authors as set-shifting tasks and utilised within the current study. An introductory script was developed and delivered in session 1 to give participants an understanding of why CRT may be beneficial, how the therapy is thought to work and what to expect from CRT. The tasks outlined within the manual were administered over the course of the 6 sessions, however, the individual therapists tailored which tasks to conduct within each session depending on the progress of the participant. Behavioural tasks were developed during the last 2 treatment sessions and utilised outwith therapy. The aim of these explicit tasks was to utilise the strategies learnt during the treatment sessions to make behavioural changes in everyday life. At the end of each of the 6 sessions, the therapist facilitated a reflective discussion with the participant which aimed to elicit the techniques used

to complete the tasks and generate ideas of how these thought patterns and new skills could be used in everyday life.

Cognitive Behavioural Therapy (CBT)

The CBT protocol (Appendix 14) was developed using the recommended structure of CBT for AN within the Handbook of Treatment for Eating Disorders as a framework.[32] An introductory script was developed and delivered in session 1 to give participants an understanding of why CBT may be a beneficial form of treatment, how CBT is thought to work and what to expect from the therapy. The following topics were covered over the 6 sessions: providing education about, and explaining the multiple functions of, anorexic symptomatology; presenting the cognitive rationale for treatment; explaining the rationale and providing advice for restoring normal nutrition and weight; prescribing normalised eating patterns; implementing self-monitoring and meal planning; developing strategies for interrupting bingeing and purgative behaviours as appropriate; increasing motivation for change; identifying dysfunctional thinking patterns; developing cognitive restructuring skills; modifying concepts of the self; challenging cultural values regarding weight and shape; summarising progress and areas of continued vulnerability; reviewing warning signs of relapse; and reviewing fundamentals of continued progress. The individual therapists tailored the content of each session depending on the progress of the participant.

4.3.5 Outcome Measures

Neuropsychological Measures

The following measures were undertaken with each participant pre treatment and post treatment. They are presented in the order that they were administered.

Intellectual Functioning

National Adult Reading Test[33] (NART)

The NART is a reading list of 50 irregularly spelt words in order of increasing difficulty designed to measure pre morbid intellectual ability. A strong correlation between IQ and reading ability has been well documented.[34] The participant is presented with a word card and asked to pronounce each word aloud. Good test-retest reliability[35] and inter-rater reliability[36] have been reported within the literature.

Set-shifting Ability

Wisconsin Card Sorting Test [37](WCST)

The WCST is a measure of an individual's ability to form abstract concepts, develop and maintain set and to utilise feedback to shift set. The test consists of 4 stimulus cards and 128 response cards depicting figures of varying form, colour and number. The participant is asked to match each consecutive response card with one

of the four stimulus cards and informed whether each response is correct or incorrect. When the participant has made a specified number of consecutive correct responses, the sorting principle is changed without warning. The participant is required to use the feedback provided to develop a new sorting strategy. The number of perseverative responses and errors made is indicative of set-shifting ability. Moderate sensitivity and moderate ecological validity have been documented.[38]

Hayling Sentence Completion Test[39] (HSCT)

The HSCT is a measure of initiation and suppression. It consists of 2 sets of 15 sentences, each with the last word missing. In part 1 the examiner reads aloud each sentence and asks the participant to complete the sentence as quickly and as accurately as possible. In part 2 the examiner reads aloud each sentence and asks the participant to complete the sentence with an entirely unconnected word as quickly and as accurately as possible. This requires the participant to inhibit the expected response. The number of errors made on this task provides an indication of set-shifting ability. Moderate sensitivity and moderate specificity[39] and modest ecological validity have been documented.[40]

Brixton Spatial Anticipation Test[39] (BSAT)

The BSAT is a measure of rule attainment and response flexibility. It consists of a 52-page booklet containing 10 circles in the same grid format on each page. One of the circles is coloured blue, the position of which changes on each page. A series of rules, which change without warning, govern the change in position. The participant is asked to determine the rule to the apparent movement of the blue circle.

The number of errors made on this task indicates set-shifting ability. Moderate sensitivity, moderate specificity[39] and modest ecological validity have been demonstrated.[40]

Delis-Kaplan Executive Function System[41] (DKEFS)

The DKEFS System is a standardised assessment of executive functioning comprising 9 subtests.[41] Three of these subtests specifically measure set-shifting: trail making test, verbal fluency and colour-word interference: (1) The Trail Making Subtest (TM) is a measure of set-shifting, which is assessed by a number-letter switching task. The time taken to complete the task and the number of errors made indicate set-shifting ability; (2) The Verbal Fluency (VF) category switching condition involves generating words and alternating between two different semantic categories (fruits and furniture). Category switch accuracy and the number of errors measure set-shifting ability; (3) Condition 4 of the Colour-Word Interference Subtest (CW) measures inhibition and set-shifting by asking the participant to switch between reading the words and naming the dissonant ink colours. The time taken to complete the task and the number of errors made indicate set-shifting ability. Good test-retest reliability, good internal consistency and validity have been documented for each of these subtests.[42]

Psychological Measures

Eating Disorders Examination – Questionnaire[43] (EDE-Q)

The EDE - Q is a self-report questionnaire designed to assess the severity of dietary restraint and concerns about eating, shape and weight over the preceding 28 days.[43] It is regarded as the "gold standard" clinical assessment for AN and bulimia nervosa.[44] Higher scores indicate greater eating pathology. Good inter-rater reliability, internal consistency and validity have been consistently documented.[45]

Hospital Anxiety and Depression Scale[46] (HADS)

The HADS is a questionnaire developed to detect clinical depression and anxiety in a hospital outpatient setting. The questionnaire comprises of 14 items; 7 items comprising of the anxiety subscale and 7 items comprising of the depression subscale. It is a widely used measure in clinical and research domains.[47] Internal consistency for both subscales has been demonstrated.[48]

Obsessive Compulsive Inventory[49] (OCI)

The OCI is a 42-item self-report measure of obsessive-compulsive symptomology consisting of 7 subscales: washing, checking, doubting, ordering, obsession, hoarding and neutralising. Foa et al. (1998) document that the OCI provides a more comprehensive examination of obsessive-compulsive symptomology than other measures due to the 7 subscales capturing the heterogeneity of obsessions and compulsions.[49] The mean score for each of the 7 subscales is calculated and the overall mean indicates the level of distress. Higher

scores suggest greater obsessive-compulsive symptomology. Test-retest reliability, high internal consistency and convergent validity have been demonstrated.[49,50]

4.3.6 Power Calculation

The sample size for the study was determined following a power calculation and statistical advice. Based on previous research investigating cognitive flexibility pre and post CRT,[51] a large effect size was estimated. Power calculations using G*Power[52] suggested analysis consisting of 2 (Time; pre treatment, post treatment) X 2 (Treatment Groups; CRT, CBT) ANOVA calculated for a large effect size (d = 0.8) at power 0.8 with alpha level of 0.05 required 20 participants per group. The current study is a pilot, which includes the first 11 of these participants.

4.3.7 Statistical Analyses

Data were analysed using the Statistical Package for Social Sciences Version 19. Both intention to treat, using last observation carried forward, and completer analyses were undertaken. Means and standard deviations were calculated for all of the variables. Comparisons between the two treatment groups in relation to demographic variables, clinical variables, psychological variables and neuropsychological variables were undertaken by means of independent samples t-tests.

Treatment outcome was investigated by a series of 2 (Time; pre treatment, post treatment) X 2 (Treatment Groups; CRT, CBT) ANOVAs with Time as the

repeated measure. Due to there being only 2 treatment groups, *post hoc* analyses in the form of independent samples t-tests and paired samples t-tests were undertaken to examine significant Time X Group interactions.

End of treatment effect sizes using Cohen's d were calculated between groups.[52] An effect size of 0.2 is defined as small, 0.5 is defined as medium, and 0.8 is defined as large. The Jacobson and Truax (1991) criteria were used to examine the clinical significance of experimental findings within the intention to treat data, which is more conservative.[53] These criteria state that clinically significant change is achieved if the post treatment score is at least 2 standard deviations in the direction of improvement from the pre treatment score. Fisher's exact tests were undertaken to examine the relationship between the treatment groups regarding the achievement of clinically significant outcome on each of the outcome measures.

4.4 RESULTS

4.4.1 Attrition rates

As shown in Figure 4.1., 14 patients meeting ICD-10 criteria for a diagnosis of anorexia nervosa or atypical anorexia nervosa were assessed for eligibility. Of the 13 referrals meeting the inclusion criteria, 2 patients (15%) declined participation due to either current academic examinations or not wanting to undertake additional assessments alongside treatment. Eleven patients consented to participate in the study, however, 9 (81.8%) completed both the pre and post assessments (5 CBT; 4 CRT). Of the participants who did not complete treatment, 1 participant from the CRT group dropped out of treatment after session 4 due to her not believing that she required treatment for her eating disorder and 1 participant from the CBT group moved away from the area after session 5.

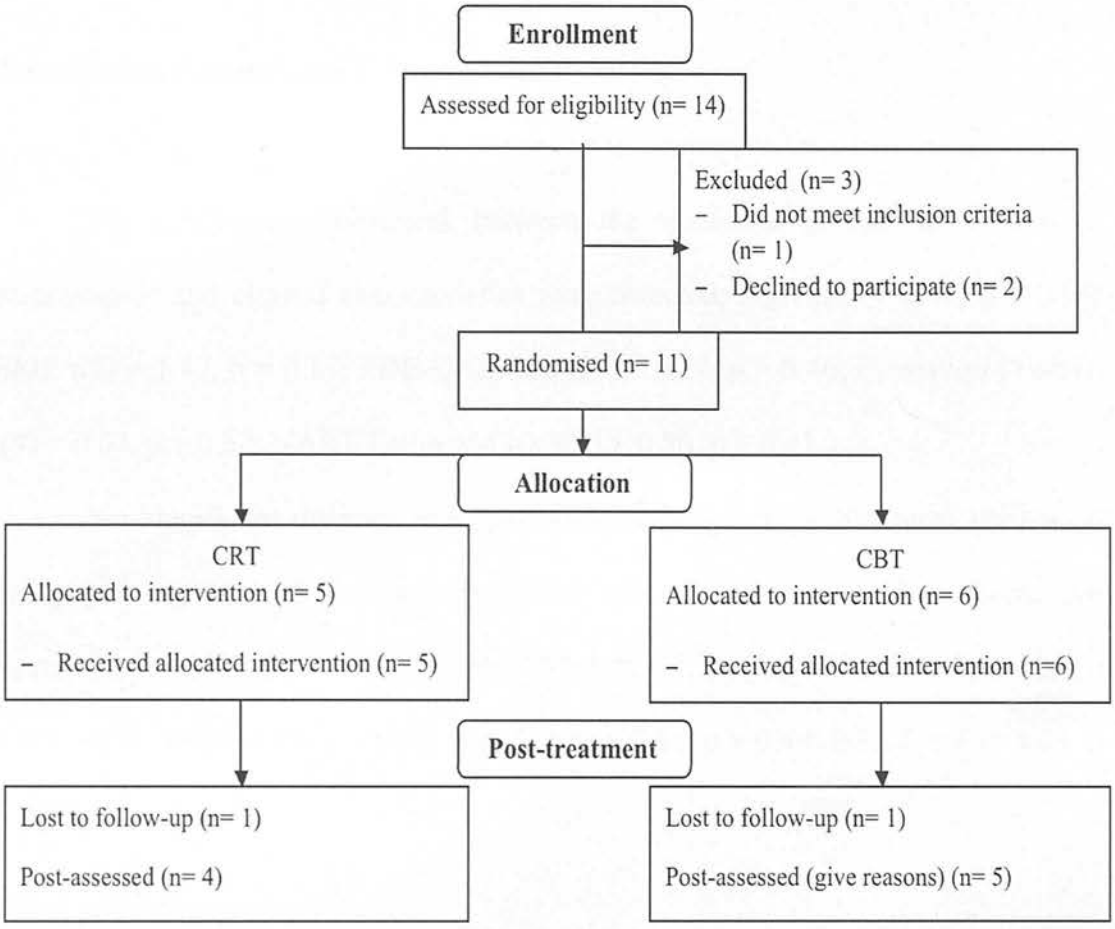

Figure 4.1. Recruitment and attrition rates

4.4.2 Intent to treat analysis

Pre treatment Comparisons

No significant differences between the treatment groups in relation to demographic and clinical characteristics were detected; Age: $t(9) = 0.07$, $p = 0.94$; BMI: $t(9) = 1.47$, $p = 0.17$; EDE-Q Global: $t(9) = 0.77$, $p = 0.46$; Education (Years): $t(9) = 0.67$, $p = 0.52$; NART Estimated IQ: $t(9) = 0.86$, $p = 0.41$.

No significant differences in performance between the treatment groups on the psychological and neuropsychological outcome measures were found pre treatment; WCST: $t(9) = 0.04$, $p = 0.97$; TM: $t(9) = 0.58$, $p = 0.58$; VF: $t(9) = 0.36$, $p = 0.73$; CW: $t(9) = 0.27$, $p = 0.79$; HSCT: $t(9) = 0.81$, $p = 0.44$; BSAT: $t(9) = 1.05$, $p = 0.32$.

Treatment Results

The mean scores and standard deviations for the 2 treatment groups on each of the outcome measures at pre treatment and post treatment are shown in Table 4.1.

Table 4.1. Pre treatment and Post treatment Means and Standard Deviations of Outcome Measures

	CRT		CBT	
Measure	**Pre treatment**	**Post treatment**	**Pre treatment**	**Post treatment**
Psychopathology				
BMI (kg/m^2)	19.1 (2.1)	19.4 (1.8)	17.5 (1.3)	17.4 (2.5)
EDE-Q Global	4.9 (0.5)	4.0 (1.0)	4.5 (1.1)	3.1 (1.3)
HADS				
Anxiety	15.0 (3.6)	14.0 (3.8)	16.0 (2.6)	13.7 (3.5)
Depression	7.0 (2.6)	7.0 (4.0)	11.2 (3.9)	9.5 (4.5)
OCI				
Total Score	71.4(36.8)	49.8(17.8)	68.5(40.9)	49.3 (38.5)
Neuropsychological				
WCST				
Perseverative Errors	9.7 (6.3)	6.5 (3.3)	6.4 (3.0)	8.0 (4.6)
DKEFS				
CW	66.8(17.0)	50.8(10.0)	70.2(23.1)	61.5 (10.7)
TM	67.6(28.6)	53.8(26.1)	80.0(39.9)	70.7 (30.9)
VF	9.5 (2.4)	15.2 (3.1)	11.6 (2.6)	13.2 (2.9)
HSCT				
Error Score	5.0 (6.4)	2.2 (3.2)	2.7 (2.6)	1.0 (1.0)

BSAT				
Error Score	17.4 (9.9)	8.8 (3.0)	13.0 (2.6)	14.0 (3.9)

Note. BMI = Body Mass Index; EDE-Q = Eating Disorder Examination – Questionnaire; HADS = Hospital Anxiety and Depression Scale; OCI = Obsessive Compulsive Inventory; WCST = Wisconsin Card Sorting Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making subtest Number/Letter Switch Time; CW = Colour-Word Interference subtest Inhibition Switch Time; VF = Verbal Fluency subtest Category Switch Accuracy; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test

As shown in Table 4.2., statistically significant Time effects were revealed for the CW ($F(1,9) = 5.35$, $p < 0.05$), the TM ($F(1,9) = 6.42$, $p < 0.05$) and the VF ($F(1,9) = 7.12$, $p < 0.05$). These results suggest a significant difference in the pre treatment and post treatment scores across both groups. No statistically significant Time effects were found on any other variable. No statistically significant Group effects were detected. A statistically significant Time X Group interaction effect was detected on the BSAT ($F(1,9) = 5.90$, $p < 0.05$). This result suggests a significant difference in the response profile of the 2 groups over time on this outcome measure. *Post hoc* analysis showed statistically significant differences between the 2 treatment groups on the BSAT at post treatment ($t(9) = 2.40$, $p < 0.05$) with the CRT group having a statistically significant lower score than the CBT group indicating greater improvement. The effect size was large ($d = 1.60$). No statistically significant Time X Group interaction effects were found on any of the other variables.

Table 4.2. Analyses of Variance of Time (Pre treatment, Post treatment) x Group (CRT, CBT) for Outcome Measures

	Time		Time X Group		Group	
	F (1,9)	p	F (1,9)	p	F (1,9)	p
Measure						
Psychopathology						
BMI (kg/m^2)	0.05	.819	0.23	.642	2.49	.149
EDE-Q Global	4.86	.055	0.19	.676	3.23	.106
HADS						
Anxiety	1.82	.210	0.29	.602	0.04	.844
Depression	0.25	.623	0.25	.623	4.05	.075
OCI						
Total Score	7.07	.026*	0.02	.877	0.01	.935
Neuropsychological						
WCST						
Perseverative Errors	0.34	.577	2.9	.129	0.12	.734
DKEFS						
CW	5.35	.046*	0.47	.509	0.72	.419
TM	6.42	.032*	0.23	.636	0.59	.461
VF	7.12	.032*	2.30	.176	0.00	.985
HSCT						
Error Score	1.82	.219	0.01	.941	0.27	.619

BSAT						
Error Score	3.70	.087	5.90	.038*	0.02	.884

Note. * $p < 0.05$; BMI = Body Mass Index; EDE-Q = Eating Disorder Examination – Questionnaire; HADS = Hospital Anxiety and Depression Scale; OCI = Obsessive Compulsive Inventory; WCST = Wisconsin Card Sorting Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making subtest Number/Letter Switch Time; CW = Colour-Word Interference subtest Inhibition Switch Time; VF = Verbal Fluency subtest Category Switch Accuracy; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test

4.4.3 Completer Analysis

Pre treatment comparisons

No significant differences between the treatment groups in relation to age, body mass index (BMI), age of AN onset, EDE-Q global score, years of education and estimated IQ were found pre treatment; Age: $t(7) = 0.03$, $p = 0.98$; BMI: $t(7) = 2.28$, $p = 0.06$; EDE-Q Global: $t(7) = 0.92$, $p = 0.39$; Education (Years): $t(7) = 1.05$, $p = 0.33$; NART Estimated IQ: $t(7) = 0.90$, $p = 0.40$.

No significant differences in performance between the treatment groups on the psychological and neuropsychological outcome measures were found pre treatment; WCST: $t(7) = 1.06$, $p = 0.32$; TM: $t(7) = 0.70$, $p = 0.50$; VF: $t(7) = 1.25$, $p = 0.25$; CW: $t(7) = 0.04$, $p = 0.97$; HSCT: $t(7) = 0.35$, $p = 0.74$; BSAT: $t(7) = 1.04$, $p = 0.33$.

Treatment Results

The mean scores and standard deviations for the 2 treatment groups on each of the outcome measures at pre treatment and post treatment are shown in Table 4.3.

Table 4.3. Pre treatment and Post treatment Means and Standard Deviations of Outcome Measures

	CRT		CBT	
	Pre treatment	**Post treatment**	**Pre treatment**	**Post treatment**
Measure				
Psychopathology				
BMI (kg/m^2)	19.7 (1.7)	20.2 (0.9)	17.4 (1.4)	17.2 (2.8)
EDE-Q Global	5.0 (0.6)	3.8 (1.1)	4.4 (1.2)	2.7 (0.9)
HADS				
Anxiety	15.0 (4.2)	13.7 (4.3)	16.0 (2.9)	13.2 (3.8)
Depression	7.2 (3.0)	7.2 (4.6)	10.0 (2.9)	8.0 (2.8)
OCI				
Total Score	79.2 (37.3)	52.2 (19.6)	63.6(43.7)	40.6 (35.7)
Neuropsychological				
WCST				
Perseverative Errors	9.7 (6.3)	6.5 (3.3)	6.4 (3.0)	8.0 (4.6)
DKEFS				
CW	68.0 (19.3)	48.0 (9.0)	68.6(25.4)	58.2 (7.8)
TM	66.7 (33.0)	49.5 (28.0)	85.0(42.5)	73.8 (33.5)
VF	9.5 (2.4)	12.2 (3.1)	11.6 (2.6)	13.2 (2.9)
HSCT				
Error Score	3.5 (6.3)	2.2 (3.2)	2.4 (2.9)	1.0 (1.0)

BSAT				
Error Score	18.5 (11.1)	7.7 (2.2)	13.2 (2.9)	14.1 (4.3)

Note. BMI = Body Mass Index; EDE-Q = Eating Disorder Examination – Questionnaire; HADS = Hospital Anxiety and Depression Scale; OCI = Obsessive Compulsive Inventory; WCST = Wisconsin Card Sorting Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making subtest Number/Letter Switch Time; CW = Colour-Word Interference subtest Inhibition Switch Time; VF = Verbal Fluency subtest Category Switch Accuracy; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test

Table 4.4. shows statistically significant Time effects for the OCI ($F(1,7) = 8.20$, $p < 0.05$), the CW ($F(1,7) = 6.04$, $p < 0.05$), the TM ($F(1,7) = 7.39$, $p < 0.05$) and the VF ($F(1,7) = 7.12$, $p < 0.05$). These results suggest a significant difference in the pre treatment and post treatment scores across both groups. No statistically significant Time effects were found on any other variable. Statistically significant Group effects for BMI ($F(1,7) = 5.57$, $p = 0.05$) and the EDE-Q ($F(1,7) = 11.21$, $p < 0.05$) were found. These results suggest a significant difference in scores across the 2 treatment groups. As shown in Table 4.3. mean BMI was higher in the CRT group and lower in the CBT group post treatment. The mean EDE-Q global score was lower in both groups post treatment, however, more so in the CBT group. No statistically significant Group effects were detected on any other measures. As with the intent to treat analysis, a statistically significant Time X Group interaction effect was detected on the BSAT ($F(1,7) = 7.67$, $p < 0.05$). This result suggests a significant difference in the response profile of the 2 groups over time on this outcome measure. *Post hoc* analysis showed statistically significant differences between the 2 treatment groups on the BSAT at post treatment ($t(7) = 2.80$, $p < 0.05$) with the CRT group having a statistically significant lower score than the CBT group, indicating greater improvement. The effect size was large ($d = 2.12$). No statistically significant Time X Group interaction effects were found on any of the other variables.

Table 4.4. Analyses of Variance of Time (Pre treatment, Post treatment) x Group (CRT, CBT) for Outcome Measures

	Time		Time X Group		Group	
	F (1,7)	p	F (1,7)	p	F (1,7)	p
Measure						
Psychopathology						
BMI (kg/m^2)	0.06	.817	0.23	.649	5.57	.050**
EDE-Q Global	5.24	.056	0.16	.699	11.21	.012*
HADS						
Anxiety	1.80	.221	0.26	.623	0.01	.915
Depression	0.24	.640	0.24	.640	3.74	.095
OCI						
Total Score	8.20	.024*	0.05	.825	0.37	.563
Neuropsychological						
WCST						
Perseverative Errors	0.34	.577	2.95	.129	0.12	.734
DKEFS						
CW	6.04	.044*	0.60	.463	0.30	.600
TM	7.39	.030*	0.33	.581	0.86	.386
VF	7.12	.032*	2.27	.176	0.00	.985
HSCT						
Error Score	1.82	.219	0.01	.941	0.27	.619

BSAT						
Error Score	4.90	.062	7.67	.028*	0.04	.845

Note. * $p < 0.05$; ** $p = 0.05$; BMI = Body Mass Index; EDE-Q = Eating Disorder Examination – Questionnaire; HADS = Hospital Anxiety and Depression Scale; OCI = Obsessive Compulsive Inventory; WCST = Wisconsin Card Sorting Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making subtest Number/Letter Switch Time; CW = Colour-Word Interference subtest Inhibition Switch Time; VF = Verbal Fluency subtest Category Switch Accuracy; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test

4.4.4 Clinically significant improvement

The number of participants who met criteria for clinically significant improvement on each of the outcome measures was calculated and is illustrated in Table 4.5. Fisher's exact tests indicated that there were no significant differences between the 2 treatment groups regarding clinically significant outcome on any of the outcome measures where at least 1 participant met criteria: EDE-Q: $p = 0.54$; HADS Anxiety: $p = 1.00$; HADS Depression: $p = 1.00$; CW: $p = 1.00$; VF: $p = 0.24$; BSAT: $p = 0.45$.

Table 4.5. Number of participants meeting clinically significant improvement at the end of treatment

	CRT (N = 5)		CBT (N = 6)	
	Yes	**No**	**Yes**	**No**
Measure				
Psychopathology				
BMI (kg/m^2)	0	5	0	6
EDE-Q Global	2	3	1	5
HADS				
Anxiety	0	5	1	5
Depression	1	4	1	5
OCI				
Total Score	0	5	0	6
Neuropsychological				
WCST				
Perseverative Errors	0	5	0	6
DKEFS				
CW	1	4	1	5
TM	0	5	0	6
VF	3	2	1	5
HSCT				
Error Score	0	5	0	6

BSAT				
Error Score	1	4	0	6

Note. BMI = Body Mass Index; EDE-Q = Eating Disorder Examination – Questionnaire; HADS = Hospital Anxiety and Depression Scale; OCI = Obsessive Compulsive Inventory; WCST = Wisconsin Card Sorting Test; DKEFS = The Delis-Kaplan Executive Function System; TM = Trail Making subtest Number/Letter Switch Time; CW = Colour-Word Interference subtest Inhibition Switch Time; VF = Verbal Fluency subtest Category Switch Accuracy; HSCT = Hayling Sentence Completion Task; BSAT = Brixton Spatial Anticipation Test

4.5 DISCUSSION

Although there is preliminary evidence to suggest that CRT may be efficacious in IAN, there are only 2 studies to date that have investigated this form of treatment in OAN. The pilot study aimed to enhance the current literature by being the first to investigate the differential change in the response profile of a range of neuropsychological measures and eating psychopathology across CRT and CBT. Due to the pilot nature of the study the results should be interpreted in a tentative manner, however, the findings provide evidence to support the use of CRT in AN and warrant further investigation.

4.5.1 Treatment Results

A statistically significant Time X Group interaction effect was detected on the BSAT, with CRT being the superior form of therapy. This indicates that CRT is more efficacious than CBT in terms of increasing set-shifting ability as measured by the BSAT. No other interaction effects were detected which suggests that neither form of therapy was superior in relation to improving any other clinical variable. NICE Guidelines (2004) advocate the use of CBT in OAN at the lowest evidence base rating.[8] The results of the current study provide tentative evidence to suggest that CRT may be as efficacious as CBT in this patient population.

Statistically significant Time effects for the DKEFS CW, VF, TM and the OCI were detected. Both forms of therapy were found to improve functioning on these measures. In relation to obsessive-compulsive symptomology, CBT is the

recommended psychological therapy in national treatment guidelines (NICE, 2005).[8] The experimental findings suggest that CRT may also improve obsessive-compulsive symptomology, however, further research is needed to examine this. Cognitive flexibility, as measured by the aforementioned DKEFS subtests, was found to improve in both the CRT and the CBT group. There is limited evidence to suggest that CBT improves set-shifting ability as measured by a range of tasks including the trail making test B.[54] The current study supports previous research by providing further evidence that CRT improves set-shifting ability,[11,28] however, the results also indicate that CBT may enhance performance on specific measures of set-shifting. Further research is required to investigate this.

4.5.2 Strengths

To the authors' knowledge this is only the second RCT comparing CRT to CBT in AN and the first to specifically investigate the differential change in the response profiles of neuropsychological functioning and psychological functioning across these treatments. By investigating the differential change in response profiles, the current study provides tentative evidence that enhances the understanding of the mechanisms of clinical change in this patient population

A strength of the current study is that it addresses methodological weaknesses of the previous research in this area.[11] The study only included participants that were over the age of 16, therefore, it is the first RCT investigating CRT in adults with AN. A range of set-shifting tasks and psychological tasks were utilised within the current study. The previous RCT administered only 2 forms of set-shifting task, the DKEFS

and the WCST, and only 3 forms of psychological measure, the EDE, the Rosenburg Self Esteem Scale (RSE) and the Beck Depression Inventory (BDI). The researchers utilised the EDE, the RSE and the BDI pre treatment, however, did not include them following the initial sessions of either CRT or CBT. The current study administered all of the set-shifting tasks and psychological measures pre and post treatment which allows for a direct comparison of the effect of both treatments on all of these variables. Although anxiety[55] and obsessive compulsive disorder[56] are 2 of the most frequent co-morbidities of AN, they were not examined in the previous study.[11]

4.5.3 Limitations

The main limitation of this study is that, as a result of it being a pilot study, it has a small sample size and is therefore underpowered. Consequently, it is important not to over interpret the current experimental findings. This limitation should be addressed within the larger study which is due to be completed in July 2014. Another limitation is that the researcher was not blind to treatment group at the post-assessment stage. However, the research procedure was standardised in order to reduce potential biases.

4.5.4 Clinical Implications

Current national treatment guidelines advocate the use of CBT for AN at the lowest grade of evidence base rating.[8] The experimental finding that CBT was not superior to CRT in relation to improving eating psychopathology or psychopathology

in this patient population provides tentative evidence that CRT may be as efficacious a treatment for AN as CBT. The results suggest that, although CRT was designed to improve cognitive flexibility, it may also have positive effects on further clinical variables including BMI and eating psychopathology in the AN population.

AN is associated with denial of illness and ambivalence towards treatment.[6] CBT for AN has a specific emphasis on identifying, challenging and modifying thoughts and behaviours in relation to eating behaviours, weight and shape. The current results indicate that this emphasis may not be advantageous, at least within the first 6 sessions of treatment. CRT does not focus on any of the aforementioned eating related thoughts or behaviours, however, was found to reduce eating psychopathology and increase BMI. Due to not focusing on the key symptomology of AN, CRT may improve treatment engagement in patients with AN. Findings from case studies support this suggestion as they indicate that patients with AN find CRT less intense than other forms of psychological therapy and more interesting.[26] Further, CRT has been found to facilitate treatment engagement in severely ill IAN.[22,23]

4.5.5 Research Implications

This is the third study to examine the use of CRT in OAN and only the second to utilize RCT methodology. The results of the current pilot study would appear to be encouraging and warrant further investigation in a larger scale study. By continuing to recruit participants for the larger study, sufficient power should be achieved. This would enable more conclusive results regarding the efficacy of CRT

in OAN and the differential change in the response profiles of neuropsychological functioning and psychological functioning across these treatments.

AN is associated with high rates of relapse.[4] The longer-term treatment effects of CRT are currently unknown. Although CRT has been found to demonstrate initial positive clinical changes, a follow up study to determine whether treatment gains are maintained over time would provide a further understanding of the efficacy of CRT in OAN.

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APPENDICES

Appendix 1

Author Guidelines: International Journal of Eating Disorders

International Journal of Eating Disorders

AUTHOR GUIDELINES

ORIGINALITY

The journal accepts for review manuscripts that have not been published or are not currently elsewhere under review.

CONTENT TYPES

Manuscripts published by IJED include: (1) Original Articles; (2) Brief Reports; (3) Critical analysis and Synthesis (reviews, articles on methodology or theoretical articles); (4) Commentaries; (5) Clinical Case Reports; (6) "An Idea Worth Researching;" and (7) Letters to the Editor. All word limits relate to the body of the text (i.e., not including abstract, references, tables or figures). These are maximum lengths, and authors are encouraged to keep their reports as short as possible while communicating clearly. The review criteria will include appropriateness of length. To summarize, the article types are:**(1) Empirical Articles** reporting substantive research that is novel, definitive or complex enough to require a longer communication. Word Limit: 7,000 words, excluding abstract, references, tables and figures Abstract: 250 words References: 40 Figures/Tables: a maximum of 8 essential tables/figures, overall **2) Brief Reports** of research that can be communicated relatively succinctly, including straightforward research designs, pilot studies and replications. Word Limit: 1,500 words, excluding abstract, references, tables and figures Abstract: 200 words References: 20 Figures/Tables: a maximum of 2 essential tables/figures, overall **(3) Critical Analysis and Synthesis/Review** articles introduce novel theoretical frameworks, address methodological issues of broad application, summarize novel clinical ideas within a theoretical and research framework (previously known as Clinical Forum papers), or critically review the status of a given research area and propose new directions for research and/or practice. Narrative and meta-analytic review papers are also welcomed if they address such issues. Word Limit: 7,000 words, excluding abstract, references, tables and figures Abstract: 250 words References: 100 Figures/Tables: no maximum, but should be appropriate to the material covered **(4) Commentaries** are written only at the invitation of the Editors, when multiple perspectives on or critical appraisal of an article would assist in placing that article in context. Word Limit: 800 - 1,500 words, excluding abstract, references, tables and figures Abstract: no abstract References: 5, using the footnote format rather than the journal's standard format Figures/Tables: none **5) Clinical Case Reports** detail key elements of cases where there is novelty in the presentation, pathology or treatment, and where that novelty will inform clinicians and researchers about rare presentations or novel ideas. This category will often be appropriate to rare biological or psychological presentations. Word Limit: 3,000 words, excluding abstract, references, tables and figures Abstract: 150

words References: 20 Figures/Tables: a maximum of 2 essential tables/figures, overall **(6) "An idea Worth Researching"** is a format where authors propose an idea that may not yet have adequate empirical support or be ready for full empirical testing, but hold great promise for advancing our understanding of eating disorders. Authors are encouraged to write a piece that is bold, forward looking, and suggestive of new and exciting avenues for research and/or practice in the field. Word Limit: 1,500 words maximum, excluding abstract, references, tables and figures Abstract: no abstract References: 5 maximum, in footnote format Figures/Tables: a maximum of 2 essential tables/figures, overall **(7) Letters to the Editor** should address key issues raised by articles in the previous edition of the journal. To facilitate such dialogue, letters need to be submitted within one week of the edition of the journal that they refer to. Word Limit: 500 words maximum Abstracts: no abstract References: 3 maximum, in footnote format. Figures/Tables: None

PREPARATION OF MANUSCRIPT & MANUSCRIPT FORMAT

General Format

Manuscripts must be typed in English and double-spaced throughout, with margins of at least one inch at the top, bottom, and both sides of each page. All manuscripts are subject to copyediting; however, it is the primary responsibility of the authors to proofread thoroughly and ensure correct spelling and punctuation, completeness and accuracy of references, clarity of expression, thoughtful construction of sentences, and legible appearance prior to the manuscript's submission. Preferred spelling follows Webster's New Collegiate Dictionary or Webster's Third New International Dictionary. The manuscript should conform to accepted English usage and syntax. Use headings to indicate the manuscript's general organization. Do not use a heading for the introduction. In general, manuscripts will contain one of several levels of headings. Centered upper case headings are reserved for Methods, Results, and Discussion sections of the manuscript. Subordinate headings (e.g., the Participants or Procedure subsection of Methods) are typed flush left, underlined, in upper case and lower case letters. The text begins a new paragraph. Number all pages of the manuscript except the figures (including title page and abstract) consecutively. Parts of the manuscripts should be arranged in the following sequence:

Number all pages of the manuscript except the figures (including title page and abstract) consecutively. Parts of the manuscripts should be arranged in the following sequence:

(1) Title page. (numbered 1) Titles should be short and specific, conveying the main point of the article. The title page should include the full names,

titles, and affiliations of all authors, and an abbreviated title (Running Head) that should not exceed 50 characters, counting letters, spacing, and punctuation. The Running Head should be typed in upper case letters centered at the bottom of the title page. Each page of the manuscript (excluding figures) should be identified by typing the first two or three words of the full title in the upper right-hand corner above the page number. No running head is required for letters to the editor. Indicate the word count for the abstract and the word count for the manuscript (excluding figures, tables, and references).

(2) Abstract. (word maximum varies by article type) For article types requiring an abstract, the abstract should be typed as a single paragraph on a separate page, numbered 2. Type the word "Abstract" in upper and lower case letters, centered at the top of page 2. Provide the following information in the form of a structured abstract, using these headings: **Objective:** briefly indicate the primary purpose of the article, or major question addressed in the study. **Method:** indicate the sources of data, give brief overview of methodology, or, if review article, how the literature was searched and articles selected for discussion. For research based articles, this section should briefly note study design, how participants were selected, and major study measures. **Results:** summarize the key findings. **Discussion:** indicate main clinical, theoretical, or research applications/implications. The *Journal* requires structured abstracts with one exception: the *Journal* will continue to use unstructured abstracts for case reports.

(3) Text. Begin the text on page 3 and be sure to identify each page with the short title typed in the upper right-hand corner above the page number. Type the full title of the manuscript centered at the top, and then begin the text. The full title appears on page 3 only. Indent all paragraphs. The maximum length for article submissions is specified for each manuscript type. Authors are advised that content be conveyed as concisely as possible.

(4) References. Begin on separate page, with the word "References" typed in upper and lower case letters, centered at the top of the page. References must be double spaced.

(5) Appendices. Type each appendix on a separate page labeled "Appendix A, B", etc., in the order in which they are mentioned in the text.

(6) Footnotes. Start on separate page.

(7) Tables. Tables should be double-spaced, including all headings, and should have a descriptive title. If a table extends to another page, so should all titles and headings. Each table should be numbered sequentially in Arabic numerals and begin on a new page. Be sure to explain abbreviations in tables even if they have already been explained in-text. Consider the tables and figures to be self-contained and independent of the text. They should be interpretable as stand-alone entities.

(8) Figure captions. Start on separate page. Each figure caption should have a brief title that describes the entire figure without citing specific panels, followed by a description of each panel. Figure captions should be included in the submitted manuscript as a separate section. Be sure to explain abbreviations in figures even if they have already been explained in-text. Consider the tables and figures to be self-contained and independent of the text. They should be interpretable as stand-alone entities. Axes for figures must be labeled with appropriate units of measurement and description.

(9) Acknowledgements/Disclosure of Conflicts. Start on a separate page. Any possible conflict of interest, financial or otherwise, related to the submitted work must be clearly indicated in the manuscript. Acknowledge significant contributions that do not warrant authorship; list sources of support (e.g., federal, industry, or other funding).

Informed Consent The Methods section should include a statement that the research was reviewed and approved by an institutional review board, and that participation involved informed consent.

Presenting Statistical Data in Text For additional detail regarding statistical requirements for the manuscript see IJED Statistical Formatting Requirements. For more detailed background information on statistical analyses and their rationale authors are referred to IJED Statistical Reporting Guidelines.

References Wiley's Journal Styles Are Now in EndNote (Wiley's Journal Styles and EndNote) . EndNote is a software product that we recommend to our journal authors to help simplify and streamline the research process. Using EndNote's bibliographic management tools, you can search bibliographic databases, build and organize your reference collection, and then instantly output your bibliography in any Wiley journal style. If you already use EndNote, you can download the reference style for this journal. To learn more about EndNote, or to purchase your own copy, click here . If you need assistance using EndNote, contact endnote@isiresearchsoft.com , or visit www.endnote.com/support

Except as noted for Commentaries, "Ideas Worth Researching" and Letters to the Editor, referencing follows the Vancouver method of reference citation. In this system, references are numbered consecutively in the order in which they are first mentioned in the text. Identify each reference in text, tables, and legends by Arabic numbers. All references cited should be listed numerically at the end of the paper. Prepare citations according to the style used in Index Medicus and the International list of periodical title word abbreviations (ISO 833).

All reference citations in the text should appear in the reference list. When there are less than seven authors, each must be listed in the citation. When seven or more authors, list the first six followed by et al. after the name of the sixth author. Representative examples are as follows:

Journal Article: 1. Endicott J, Spitzer RL. A diagnostic interview: The schedule for affective disorders and schizophrenia. Arch Gen Psychiatry 1978;35:837-844.

Book Chapter: 2. Fairburn CG, Cooper Z. The eating disorders examination (12th ed). In: Fairburn CG, Wilson GT, editors. Binge eating: nature, assessment, and treatment. New York: The Guilford Press, 1993, p. 317-331.

Book: 3. Tudor I. Learner-centeredness as language education. Cambridge: Cambridge University Press; 1996.

Preparation of figures. To ensure the highest quality print production, your figures must be submitted in TIFF format according to the following minimum resolutions:

1200 dpi (dots per inch) for black and white line art (simple bar graphs, charts, etc.)
300 dpi for halftones (black and white photographs)
600 dpi for combination halftones (photographs that also contain line art such as labeling or thin lines)
Vector-based figures (usually created in Adobe Illustrator) should be submitted as EPS. Do not submit figures in the following formats:JPEG,GIF,Word, Excel, Lotus1-2-3, PowerPoint, PDF.

Graphs must show an appropriate grid scale. Each axis must be labeled with both the quantity measured and the unit of measurement. Color figures must be submitted in a CMYK colorspace. Do not submit files as RGB. All color figures will be reproduced in full color in the online edition of the journal at no cost to authors. Authors are requested to pay the cost of reproducing color figures in print. Authors are encouraged to submit color illustrations that highlight the text and convey essential scientific information. For best reproduction, bright, clear colors should be used.

Supplementary materials. Supplementary materials will be made available to readers as a link to the corresponding articles on the journal's website.

ADDITIONAL GUIDELINES FOR COPYEDITING OF MANUSCRIPTS FOR INTERNATIONAL JOURNAL OF EATING DISORDERS

1. Some authors use terms such as "anorexics" or "bulimics" as personal pronouns, referring to groups of individuals by their common diagnosis. Language of this type should be replaced with such terms as "individuals with anorexia nervosa", "people with bulimia nervosa", or "participants with eating disorders".

2. The term "participants" should be used thought the article instead of "subjects".

3. Standard rules will continue to govern the use of capitalization in Headings and Subheadings. However, when a minor word in a Heading or Subheading

actually has special or unique meaning, the rule should be overridden.

4. When referring to gender, “males" and “females” should be used in cases where the study samples include both children (below age 18) and adults; when the participants comprise adults only, the terms “men” and “women” should be used. In articles that refer to children (i.e., below the age of 13), “boys” and “girls” should be used.

5. In articles that refer to genetic material, the names of genes should be spelled out in full the first time they appear in the text, after which an italicized abbreviation can be substituted.

6. The word “data” is plural; therefore, text should follow accordingly (for example, “The data show...the data are ... the data were...”).

APPENDIX 2

Letter of NHS Ethics Committee Approval

NHS Fife NHS Forth Valley NHS Tayside

Fife, Forth Valley & Tayside Research Ethics Service

Tayside Committee on Medical Research Ethics A
Research Ethics Office
Level 9
Ninewells Hospital & Medical School
DUNDEE
DD1 9SY

Department of Clinical Neuropsychology
Level 6
South Block
Ninewells Hospital
Dundee
DD1 9SY

Date: 29 January 2009
Your Ref:
Our Ref: FB/LR/08/S1401/133
Enquiries to: Miss Fiona Bain
Extension: Ninewells extension 32701
Direct Line: 01382 632701
Email: fionabain@nhs.net

Dear

Full title of study: Neuropsychological Correlates of Anorexia Nervosa
REC reference number: 08/S1401/133

Thank you for your letter of 19 January 2009, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Sub-Committee.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to the research sites listed on the attached form.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission at NHS sites ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Letter from College of Humanities and Social Science		14 November 2008
References for Literature cited in Application	1	13 November 2008
Letter from Stirling University		10 November 2008
Priory Insurance		01 July 2008
Letter from Priory		05 November 2008
Participant Consent Form	1	13 November 2008
Questionnaire: SPSI		
Questionnaire: SLCS		
Questionnaire: Y-BOCS		
Questionnaire: SCL-90		
Letter from Sponsor		11 November 2008
Covering Letter		17 November 2008
Protocol	3	14 November 2008
Investigator CV		13 November 2008
Application	1	17 November 2008
Flowchart of protocol in non-technical language	1	13 November 2008
Intyerview schedule - The Eating Disorder Examination (EDE)		
Summary CV for supervisor		13 November 2008
the University of Edinburgh - Professional Indemnity Insurance Renewal Date: 01/082009		05 September 2008
Response to Request for Further Information		19 January 2009
Participant Information Sheet: University of Stirling	2	19 January 2009
Participant Information Sheet: Tayside Eating Disorders Service	2	19 January 2009
Participant Information Sheet: Priory Hospital	2	19 January 2009

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review –guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

08/S1401/133	**Please quote this number on all correspondence**

Yours sincerely

L. Reilly

Dr. Carlos Wigderowitz
Chair

Email: ethicshelpline.tayside@nhs.net

Enclosures: "After ethical review – guidance for researchers"
Site approval form

Copy to: Ms Elspeth Currie, Edinburgh Clinical Trials Unit
NHS Tayside R&D office

Appendix 3

Letter of private sector hospital Ethics Committee approval

THE PRIORY HOSPITAL GLASGOW

AY.SM

9th November 2011

CONFIDENTIAL

Department of Clinical Neuropsychology
Ninewells Hospital
Dundee
DD1 9SY

Dear

I am pleased to inform you that your proposal "A comparison of set-shifting ability in inpatients and outpatients with anorexia nervosa" has been approved by the Priory Hospital Ethics Committee.

Yours sincerely,

B. Maldonado (MM)

P.P Dr Alex Yellowlees
Consultant Psychiatrist
Medical Director

The Priory Hospital Glasgow, 38-40 Mansionhouse Road, Glasgow, G41 3DW
Tel: 0141 636 6116 Fax: 0141 636 5151 Email: glasgow@priorygroup.com www.priorygroup.com
Priory Healthcare Limited trading as the Priory Hospital Glasgow. Registered Office: 21 Exhibition House, Addison Bridge Place, London, W14 8XP.

Appendix 4

Letter of NHS Research and Development approval

NHS
Tayside

EC/LH

04 February 2009

Department of Clinical Neuropsychology
Level 6 South Block
Ninewells Hospital & Medical School
DUNDEE
DD1 9SY

Dear

NHS TAYSIDE MANAGEMENT/GOVERNANCE APPROVAL

R&D Project ID: 2008MH14

Title: Neuropsychological Correlates of Anorexia Nervosa.

Ethics Ref: 08/S1401/133 Ethics Approval Date: 29/01/09

Funder: Unfunded – student project

Sponsor: University of Edinburgh

NHS Support Costs: £5,280

The above project has been registered on the NHS Tayside R&D database, as required by the Research Governance Framework. Full ethics approval has been obtained and there are £5,280 of local NHS Support Costs associated with this research project.

NHS Tayside has no objection to the project proceeding, provided all necessary approvals are in place and all amendments to the protocol, personnel involved and funding be notified to the R&D Office and all appropriate personnel.

It is important to note that all research must be carried out in compliance with the Research Governance Framework for Health & Community Care, GCP and the new EU Clinical Trials Directive (for clinical trials involving investigational medicinal products).

Kind Regards

Elizabeth Coote.

Elizabeth Coote
Non-Commercial
R&D Manager

c.c. Mrs Lorraine Reilly (Assistant Administration Manager, NHS Tayside)
Elspeth Currie (Research Governance Manager, University of Edinburgh)

Appendix 5

Participant Information Sheets

NHS
Tayside

Participant Information Sheet: Tayside Eating Disorders Service
Neuropsychological Correlates of Eating Disorders in Adult Females

You are being invited to take part in a research study. We believe it to be of potential importance. Before you decide whether or not you wish to participate, we would like to explain why the study is being carried out, and what taking part will involve for you. Please read the following information carefully. If you have any questions please contact either of the people named at the bottom of this sheet, who will be happy to discuss the study and provide further information.

Background to the Study

Investigation of brain functioning in anorexia nervosa is a relatively new field, however it is widely recognised as having potential to advance our understanding of eating disorders. Many aspects of brain functioning have been investigated in eating disorder populations including general intelligence, attention, memory, learning, visuospatial processing, and executive functioning. "Executive functioning" refers to a set of skills which include problem solving, planning, organisation, shifting attention, and decision making. There is evidence to suggest aspects of executive functioning may be impaired in this population. However it is not known how these impairments may affect individuals and their relationship to psychological characteristics commonly seen in people with eating disorders.

It is hoped this study will advance our understanding of eating disorders and help inform new interventions.

Why have I been chosen?

The study aims to compare individuals with anorexia nervosa, and other eating disorders to a non-clinical control group. You are being asked to participate as part of one of the clinical groups, as you are receiving treatment for an eating disorder in NHS Tayside. Everyone meeting certain criteria attending Tayside Eating Disorders Service will be asked to consider taking part in the study.

Do I have to take part?

It is entirely your decision as to whether or not you take part in the study. If you decide to take part, you may withdraw at any time, without giving a reason. Equally, you may choose not to take part at all. **Your decision to take part or not, and the answers that you give will not influence any treatment that you are currently being given or may receive in the future**.

What does taking part involve?

If you decide you would like to take part in the study, you should let your clinician know, and they will pass your details on to a member of the research team to arrange a meeting. During the meeting you will be given the opportunity to ask questions about the study and then if you wish to proceed to complete a consent form. The

investigator will interview you about your eating behaviour and collect some basic information. The investigator will then administer a range of neuropsychological tests. These are similar to tests seen on "brain training" games and involve problem solving and pen and paper tasks. This will take approximately 45-60 minutes. You will then be given a short break before being asked to fill in 4 questionnaires. In total this will take about 1.5-2 hours. After participation in the study you will have the opportunity for discussion with the investigator and get general feedback about your neuropsychological test performance. The treatment you will receive if you do take part in the study will be no different from the treatment you would receive otherwise.

What are the possible disadvantages and advantages of taking part?

The study will take approximately 1.5-2 hours to complete, which you may find an inconvenience. The questions and tests administered are the same for every participant, and are not intended to reflect any personal causes of eating disorders however some of the questions asked during interview or in the questionnaires may give rise to difficult feelings. The investigator will be available to discuss any issues that may arise during participation, and can direct you to external sources of support. After participation you will have a discussion with the investigator and get general feedback about your neuropsychological test performance, which may be of interest. It is hoped that the information gathered will be of value in enhancing our understanding of anorexia nervosa and in informing new interventions.

Will my taking part in the study be confidential?

Participation in the study is completely confidential. Confidentiality may be limited if there is an issue of risk to yourself or others, in which instance clinical staff within Tayside Eating Disorders Service will be informed.

Has this study been ethically reviewed?

The study has been reviewed by The University of Edinburgh's School of Health ethics committee and The University of Stirling Psychology Department ethics committee. It has been approved through NHS Tayside Research Ethics Committee and NHS Tayside Research and Development Department.

How can I make a complaint about this study?

If you believe that you have been harmed in any way by taking part in the study you have the right to pursue a complaint and seek any resulting compensation. As a patient of the NHS, you have the right to pursue a complaint through the usual NHS process. To do so you can submit a written complaint to the Patient Liaison Manager, Complaints Office, Ninewells Hospital (Freephone 0800 027 5507). Note that the NHS has no legal liability for non-negligent harm. However if you are harmed and this is due to someone's negligence, you may have grounds for a legal action against NHS Tayside but you may have to pay your legal costs.

Contact Details
If you would like more information on the study or have any questions, please contact:
******** or ******** Department of Clinical Neuropsychology, Level 6, Ninewells Hospital, Dundee, DD1 9SY.
Tel: 01382 740 406 Email: ********

For independent advice from someone who is not directly involved in the research, please contact: Dr Alex Yellowlees, Consultant Psychiatrist, The Priory Hospital, 38-40 Mansionhouse Road, Glasgow, G41 3DW.
Tel: 0141 636 6116 email: AlexYellowlees@priorygroup.com

Thank you for taking the time to read this information sheet.

NHS
Tayside

Participant Information Sheet: Priory Hospital
Neuropsychological Correlates of Eating Disorders in Adult Females

You are being invited to take part in a research study. We believe it to be of potential importance. Before you decide whether or not you wish to participate, we would like to explain why the study is being carried out, and what taking part will involve for you. Please read the following information carefully. If you have any questions please contact either of the people named at the bottom of this sheet, who will be happy to discuss the study and provide further information.

Background to the Study

Investigation of brain functioning in anorexia nervosa is a relatively new field, however it is widely recognised as having potential to advance our understanding of eating disorders. Many aspects of brain functioning have been investigated in eating disorder populations including general intelligence, attention, memory, learning, visuospatial processing, and executive functioning. "Executive functioning" refers to a set of skills which include problem solving, planning, organisation, shifting attention, and decision making. There is evidence to suggest aspects of executive functioning may be impaired in this population. However it is not known how these impairments may affect individuals and their relationship to psychological characteristics commonly seen in people with eating disorders.

It is hoped this study will advance our understanding of eating disorders and help inform new interventions.

Why have I been chosen?

The study aims to compare individuals with anorexia nervosa, and other eating disorders to a non-clinical control group. You are being asked to participate as part of the clinical group, as you have been diagnosed with anorexia nervosa, and are an inpatient at the Priory Hospital. Everyone admitted to the Priory Hospital eating disorders unit over approximately the next year will be asked to consider taking part in the study.

Do I have to take part?

It is entirely your decision as to whether or not you take part in the study. If you decide to take part, you may withdraw at any time, without giving a reason. Equally, you may choose not to take part at all. **Your decision to take part or not, and the answers that you give will not influence any treatment that you are currently being given, or treatment you may receive in the future.**

What does taking part involve?

If you decide you would like to take part in the study, you should speak to the investigator present at the community meeting, and sign up for a meeting. During the meeting you will be given the opportunity to ask questions about the study and then

if you wish to proceed to complete a consent form. The investigator will interview you about your eating behaviour and collect some basic information. The investigator will then administer a range of neuropsychological tests. These are similar to tests seen on "brain training" games and involve problem solving and pen and paper tasks. This will take approximately 45-60 minutes. You will then be given a short break before being asked to fill in 4 questionnaires. In total this will take about 1.5-2 hours. You will be asked to go through this procedure during the first week of your treatment and again in the week before you are discharged. Some information, such as how long you have had your eating disorder and what medication you are currently prescribed will be obtained, with your permission, from your case notes. After participation in the study you will have the opportunity for discussion with the investigator and get general feedback about your neuropsychological test performance. The treatment you will receive if you do take part in the study will be no different from the treatment you would receive otherwise.

What are the possible disadvantages and advantages of taking part?

Each part of the study will take approximately 1.5-2 hours to complete, which you may find an inconvenience. The questions and tests administered are the same for every participant, and are not intended to reflect any personal causes of eating disorders however some of the questions asked during interview or in the questionnaires may give rise to difficult feelings. After finishing the meeting a nurse will be available within the eating disorders unit to provide support should you wish to discuss these feelings further. After participation you will have a discussion with the investigator and get general feedback about your neuropsychological test performance, which may be of interest. It is hoped that the information gathered will be of value in enhancing our understanding of anorexia nervosa and in informing new treatments.

Will my taking part in the study be confidential?

Participation in the study is completely confidential. Confidentiality may be limited if there is an issue of risk to yourself or others, in which instance clinical staff at the Priory Hospital will be informed.

Has this study been ethically reviewed?

The study has been reviewed by The University of Edinburgh's School of Health ethics committee, and The University of Stirling Psychology Department ethics committee. It has been approved through NHS Tayside Research Ethics Committee and NHS Tayside Research and Development Department.

How can I make a complaint about this study?

If you are dissatisfied with any aspect of this research, I would encourage you to get in touch with either of the named investigators below, so that we can try to resolve any issues. Should you wish to make a formal complaint, this can be done through the NHS complaints procedure. Details can be obtained from your GP or by contacting the Psychological Therapies Department secretary (01382 306156) at 7 Dudhope Terrace, Dundee.

Contact Details

If you would like more information on the study or have any questions, please contact:

******** or ******** Department of Clinical Neuropsychology, Level 6, Ninewells Hospital, Dundee, DD1 9SY.
Tel: 01382 740 406 email: ********

For independent advice from someone who is not directly involved in the research, please contact:
Dr Alex Yellowlees, Consultant Psychiatrist, The Priory Hospital, 38-40 Mansionhouse Road, Glasgow, G41 3DW.
Tel: 0141 636 6116 email: AlexYellowlees@priorygroup.com

Appendix 6

Participant Consent Form

Consent Form

Title of Project: Neuropsychological Correlates of Anorexia Nervosa

This form must be completed and signed by the subject in the presence of someone with knowledge of the research designated by the Principal Investigator. This may be a doctor, nurse, clinical psychologist or other member of the research team who must countersign the form as witness to the subject's signature.

1. I confirm that I have read and understood the subject information sheet for the above study.

2. I have had an opportunity to ask questions and further discuss the study; and have received satisfactory answers to all my questions. I feel I have now received enough information about the study.

3. I understand that my participation is entirely voluntary and that I have the right to withdraw from the study at any stage without giving a reason. I understand this will have no impact on my present or future medical care. If I decide to withdraw from the study the data already collected with consent will be retained and included in the study analysis.

4. I understand that all information collected during study participation will be confidential. Confidentiality may be limited if there is an issue of risk to myself or others, in which instance the Clinical/University staff will be informed.

5. I agree to participate in this study.

Name of Subject	Signature	Date
Name of Witness	Signature	Date

Appendix 7

Letters of NHS Ethics Committee Approval

EoSRES

NHS SCOTLAND

East of Scotland Research Ethics Service (EoSRES) REC 1
(formerly Tayside Committee on Medical Research Ethics A/B)
Tayside Medical Sciences Centre (TASC)
Residency Block C, Level 3
Ninewells Hospital & Medical School
George Pirie Way
Dundee DD19SY

****
****
NHS Tayside Psychological Therapies Service
Department of Clinical Neuropsychology
Level 6 South Block, Ninewells
Dundee
DD1 9SY

Date: 23 March 2012
Your Ref:
Our Ref: LR/12/ES/0025
Enquiries to: Mrs Lorraine Reilly
Extension: Ninewells extension: 40099
Direct Line: 01382 740099
Email: lorraine.reilly@nhs.net

Dear Dr Livingstone

Study title:	**The effectiveness of Cognitive Remediation Therapy as a component of treatment for anorexia nervosa**
REC reference:	**12/ES/0025**
Protocol number:	**N/A**

The Research Ethics Committee reviewed the above application at the meeting held on 16 March 2012. Thank you to ******** and ******** for attending to discuss the study.

Ethical opinion

You clarified the following points. There is no requirement to respond unless there are any inaccuracies:

1. The Committee required clarification as the design of the study seemed to suggest that as the experimental group would receive remediation sessions as well as CBT any improvement in outcomes could be due to the increase in treatment contact rather than to remediation particularly. ******** stated that it was a valid point and confirmed that new cases would be eligible for inclusion in the study and that non- experimental group (receiving treatment as usual) would continue in treatment after the end of the study and an evaluation would be taken at that point. He also confirmed that it would be possible to detect the effects of the remediation intervention as comparisons between the two groups would take place at intervals through the study and not only at the conclusion of the intervention.

2. ******** confirmed that ******** had carried out a paper on the subject in 2009 and passed all clinical doctorate assessments. Other studies had utilised designs involving batteries of questionnaires without problems having arisen. ******** also confirmed that remediation studies in this area had been carried out in Oslo and then in the UK at the Priory by ******** initially in schizophrenic patients and then brain injury patients which had been found to be effective in that population. There were 3-4 published studies carried out on anorexia patients but a specific test of the cognitive remediation therapy had yet to be carried out.

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Further information or clarification required

The following points require to be addressed by letter and submission of revised documentation where requested. **Please note that there is no requirement to amend your application form.**

1. Regarding the application form:

    - Regarding A57 Primary Outcome – the Committee required more information as it only stated 'Wisconsin Card Sorting Test (WCST) (Heaton, 1981)

2. The Participant Information Sheet (PIS) should be amended as follows:

    - The title of the study should be inserted at the top of first page.

    - Under 'What is involved at this stage?' – it is unclear how often the questionnaires are administered as the Protocol and Participant Information Sheet discusses sessions not time periods.

    - P3 third paragraph starting 'Group 2 (CBT alone) – the committee commented that the paragraph was a little confusing and hard to understand and suggested that a chart could be included for simplicity and more definition about what the tests involve.

    - Please insert a section informing participants what they required to do if they wanted to withdraw from the study and what would happen with the data collected up to that point as per A35 of the application form.

    - Under 'Who has reviewed the study?' – 'The Tayside Committee on Medical Research Ethics,' should read 'The East of Scotland Research Ethics Service REC 1,'

    - In relation to BPS guidelines allowing patients option of omitting questions in questionnaires – Professor Power confirmed that questions may be perceived as leading but has justification for not allowing patients to leave out questions.

Please submit a revised PIS, which should include a new version number and new full date.

3. The Consent Form should be amended as follows:

- Please insert the version number and full date of the Participant Information form into statement 1.

- Insert a statement which reflects A35 of the application form.

Please submit a revised Consent Form, which should include a version number and full date as a footer and the new date and version number of the Participant Information Sheet in Statement 1.

4. Please send signed and dated CV's the CI, student and supervisor.

Ethical review of research sites

NHS Sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non NHS sites

The Committee has not yet been notified of the outcome of any site-specific assessment (SSA) for the non-NHS research site(s) taking part in this study. The favourable opinion does not therefore apply to any non-NHS site at present. I will write to you again as soon as one Research Ethics Committee has notified the outcome of a SSA. In the meantime no study procedures should be initiated at non-NHS sites.

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Confirmation should also be provided to host organisations together with relevant documentation

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date	
Covering Letter		01 March 2012	
GP/Consultant Information Sheets	1	12 January 2012	
Investigator CV			
Letter from Sponsor		02 March 2012	
Other: Cognitive Remediation therapy - 6 session manual	1	26 February 2012	
Other: Supervisor CV - Dr Livingstone			
Other: Supervisor CV - Dr Newman			
Other: Recruitment Protocol Flowchart	1	28 February 2012	
Other: CBT - 6 session manual	1	26 February 2012	
Participant Consent Form	1	02 March 2012	
Participant Information Sheet	1	26 February 2012	
Protocol	1.0	26 February 2012	
REC application	88057/299820/	02 March 2012	

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

12/ES/0025:	Please quote this number on all correspondence

Yours sincerely

Dr Fergus Daly
Vice-chair

Email: lorraine.reilly@nhs.net

EoSRES

NHS SCOTLAND

East of Scotland Research Ethics Service (EoSRES) REC 1
(formerly Tayside Committee on Medical Research Ethics A/B)
Tayside Medical Sciences Centre (TASC)
Residency Block C, Level 3
Ninewells Hospital & Medical School
George Pirie Way
Dundee DD19SY

****

NHS Tayside Psychological Therapies Service
Department of Clinical Neuropsychology
Level 6 South Block
Ninewells Hospital & Medical School
Dundee
DD1 9SY

Date: 13 April 2012
Your Ref:
Our Ref: **LR/DL/12/ES/0025**
Enquiries to: Mrs Lorraine Reilly
Extension: Ninewells extension: 40099
Direct Line: 01382 740099
Email: lorraine.reilly@nhs.net

Dear Miss Cook

Full title of study: **The effectiveness of Cognitive Remediation Therapy as a component of treatment for anorexia nervosa**

REC reference number: **12/ES/0025**

Thank you for your letter of 13 April 2012. I can confirm the REC has received the documents listed below as evidence of compliance with the approval conditions detailed in our letter dated 16 March 2012. Please note these documents are for information only and have not been reviewed by the committee.

Documents received

The documents received were as follows:

Document	Version	Date
Covering Letter		13 April 2012
Investigator CV		13 April 2012
Investigator CV		27 March 2012
Investigator CV		12 April 2012
Investigator CV		02 April 2012
Investigator CV		29 March 2012
Participant Consent Form	2	30 March 2012
Participant Information Sheet	2	30 March 2012

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

12/ES/0025	**Please quote this number on all correspondence**

Yours sincerely

Mrs Diane Leonard
Assistant Co-ordinator

E-mail: diane.leonard@nhs.net

Copy to: NHS Tayside R&D office

Appendix 8

Letter of private sector hospital Ethics Committee approval

THE
PRIORY
HOSPITAL
GLASGOW

AY.SM

20th July 2012

Department of Clinical Neuropsychology
Ninewells Hospital
Dundee
DD1 9SY

Dear

I am pleased to inform you that your proposal "A comparison of Cognitive Remediation Therapy and Cognitive Behavioural Therapy in anorexia nervosa: A pilot randomised controlled trial" has been approved by the Priory Hospital Ethics Committee.

Yours sincerely,

B. Mclellan (Mrs)

Dr Alex Yellowlees
Consultant Psychiatrist
Medical Director

The Priory Hospital Glasgow, 38-40 Mansionhouse Road, Glasgow, G41 3DW
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Appendix 9

Letter of NHS Research and Development approval

NHS
Tayside

23 April 2012

Department of Clinical Neuropsychology
Level 6, South Block
Ninewells Hospital
Dundee
DD1 9SY

Dear [redacted]

R & D MANAGEMENT APPROVAL - TAYSIDE

Title: The effectiveness of Cognitive Remediation Therapy as a component of treatment for anorexia nervosa.

Chief Investigator:

Principal Investigator:

Tayside Ref: 2012NF01 NRS Ref: N/A

REC Ref: 12/ES/0025

EudraCT Ref: N/A CTA Ref: N/A

Sponsor(s): Tayside Health Board

Funder(s): Unfunded

Many thanks for your application to carry out the above project here in NHS Tayside. I am pleased to confirm that the project documentation (as outlined below) has been reviewed, registered and Management Approval has been granted for the study to proceed locally in Tayside.

Approval is granted on the following conditions:-

- ALL Research must be carried out in compliance with the Research Governance Framework for Health & Community Care, Health & Safety Regulations, data protection principles, statutory legislation and in accordance with Good Clinical Practice (GCP).
- All amendments to be notified to TASC R & D Office.
- All local researchers must hold either a Substantive Contract, Honorary Research Contract, Honorary Clinical Contract or Letter of Access with NHS Tayside where required (http://www.nihr.ac.uk/systems/Pages/systems_research_passports.aspx).
- TASC R & D Office to be informed of change in Principal Investigator, Chief Investigator or any additional research personnel locally.

Version 3 – 15/03/2012

- Notification to TASC R & D Office of any change in funding.

- As custodian of the information collated during this research project you are responsible for ensuring the security of all personal information collected in line with NHS Scotland IT Security Policies, until destruction of this data.

- All eligible studies will be added to the UKCRN Portfolio http://public.ukcrn.org.uk/. Recruitment figures for eligible studies must be recorded onto the Portfolio every month: This is the responsibility of the lead UK site. If you are the lead, or only, UK site, we can provide help or advice with this. For information, contact Charles Weller – (01382) 7 40128 – charles.weller@nhs.net or Liz Livingstone – (01382) 7 40126 – elivingstone@nhs.net.

- Annual reports are required to be submitted to TASC R & D Office with the first report due 12 months from date of issue of this management approval letter and at yearly intervals until completion of the study.

- Notification of early termination within 15 days or End of Trial within 90 days followed by End of Trial Report within 1 year to TASC R & D Office.

- You may be required to assist with and provide information in regard to audit and monitoring of study.

Please note you are required to adhere to the conditions, if not, NHS management approval may be withdrawn for the study.

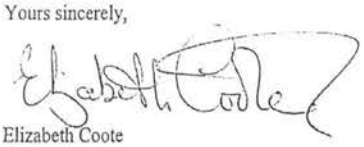
Approved Documents

Document	Version	Date
Protocol	1.0	26/02/12
IRAS R & D Form 88057/303006/14/559		
SSI Form 88057/304828/6/100/122481/238694		
PIS	2	30/03/12
Consent Form	2	30/03/12
Letter from Sponsor		02/03/12
GP/Consultant Information sheet	1	12/04/12
Cognitive Behavioural Therapy 6 session manual	1	26/02/12
Cognitive Remediation Therapy 6 session manual	1	26/02/12
Recruitment Protocol Flowchart	1	28/02/12
CV – Brian Grieve		02/04/12
CV – Moira Cook		13/04/12
CV – Alison Livingstone		12/04/12
CV – Emily Frances Newman		29/03/12
Ethics favourable opinion letter		23/03/12
Ethics letter of compliance		13/04/12

May I take this opportunity to wish you every success with your project.

Please do not hesitate to contact TASC R & D Office should you require further assistance.

Yours sincerely,



Elizabeth Coote
R&D Manager

Version 3 – 15/03/2012

Appendix 10

Letter of NHS Sponsorship

TASC
TAyside medical Science Centre

KG/CF
Friday, 02 March 2012

Department of Clinical Neuropsychology
Level 6, South Block
Ninewells Hospital
Dundee
DD1 9SY

Dear

Sponsorship Letter

Sponsor/NHS R&D Reference Number: 2012NF01
Study Title: The effectiveness of Cognitive Remediation Therapy as a component of treatment for anorexia nervosa.

Under the requirements of the Scottish Executive Health Department Research Governance Framework for Health and Community, Tayside Health Board agrees to act as Sponsor for this trial. Sponsorship is subject to you obtaining a favourable ethical opinion and NHS Tayside R&D management approval.

Enclosed is a Chief Investigator Declaration. You should read it to familiarise yourself with the terms, sign the agreement on page four, completing the remaining details and return a copy to the TASC Research Governance Manager.

Following receipt of all relevant approvals, you should ensure that any subsequent amendments are notified to the Sponsor, REC and relevant NHS R&D Office(s), and that an annual progress report is submitted to the Sponsor, REC and NHS R&D Tayside.

Please ensure yourself and your study staff are familiar with the TASC Standard Operating Procedures and guidelines (available at http://www.tasc-research.org.uk/_page.php?id=157), and we strongly recommend that they have received Good Clinical Practice training before the study commences.

Finally please contact Dr. Vera Nuritova (f.nuritova@dundee.ac.uk) or Dr Keith Gillon (k.gillon@dundee.ac.uk) should you have any queries.

Signed for and on behalf of Tayside Health Board

Elizabeth Coote

pp Prof. Jill Belch
R&D Director, TASC

NHS Tayside

Dr Keith Gillon, TASC (Tayside Medical Science Centre),
Ninewells Hospital & Medical School, TASC Research & Development Office, Residency Block, Level 3, George Pirie Way, Dundee DD1 9SY.
k.gillon@dundee.ac.uk or PA , Leigh De Melo, l.demelo@dundee.ac.uk; Telephone 01382. 740129

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Appendix 11

Participant Information Sheet

PARTICIPANT INFORMATION SHEET

The effectiveness of Cognitive Remediation Therapy as a component of treatment for anorexia nervosa.

INVITATION

My name is ********. I am undertaking a doctoral training course in Clinical Psychology at the University of Edinburgh. As part of this course I am required to undertake a research study. I would like to invite you to take part in the following research study. However, before you decide whether or not you wish to participate, I need to be sure that you understand firstly why we are doing it, and secondly what it would involve if you agreed. I am therefore providing you with the following information. Please read it carefully and ask any questions you may have, and, if you want, discuss it with others including your friends and family. I will do my best to explain and to provide any further information you may ask for now or later.

Please note: You do not have to make an immediate decision about taking part in the study and you can take the information away before you decide.

Background to the study
There is a range of treatments for anorexia nervosa. One of the standard treatments is Cognitive Behavioural Therapy (CBT). A novel treatment we are investigating is called Cognitive Remediation Therapy (CRT). It has been suggested that CRT may enhance the effectiveness of CBT. NHS Tayside Eating Disorders Service routinely offers both treatments.

What is Cognitive Remediation Therapy?
CRT consists of mental exercises aimed at improving thinking styles and information processing. The exercises are paper and pen tasks, which help to explore new ways of thinking and help enhance problem solving.

What is Cognitive Behavioural Therapy?
CBT is a structured therapy that aims to make individuals thinks about the connections between thinking, emotions, behaviour and bodily symptoms. The goal of CBT is to change behaviour patterns and beliefs.

What are the differences between Cognitive Remediation Therapy and Cognitive Behavioural Therapy?
CRT does not involve talking about your eating behaviour, weight or shape concerns or your emotions. The tasks used in CRT allow for a regular sense of achievement. CRT is not a standalone treatment for anorexia nervosa. Instead, it is a pre-treatment that will hopefully enhance the effectiveness of CBT.

Why have I been asked to take part in the study?
You have been asked to take part in the study as the clinician who has been working with you felt you might benefit from receiving CRT and CBT or CBT alone.

Do I have to take part?
No, you do not have to take part in the study. We will provide you with information and answer any questions and it is then entirely up to you if you want to take part. **You are free to not take part or withdraw from the study at any time and you do not have to give a reason for this.** If you decide not to take part or withdraw from the study this will not affect any treatment you currently receive or any treatment you receive in the future

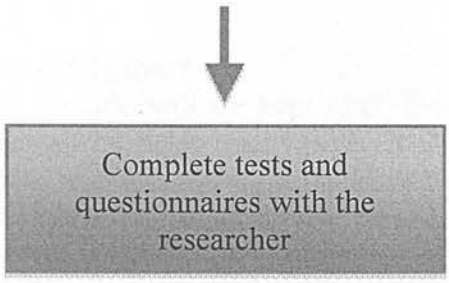
What is involved at this stage?

- **Option 1 – Decline to take part**
  If having received all the information you do not wish to take part in the study you should choose this option. You should let your clinician know your decision. If you choose this option your normal care and treatment will not be affected and you will continue with whatever you have been receiving as part of your normal, routine care. **Taking part in the study is entirely voluntary and you are free to choose this option**

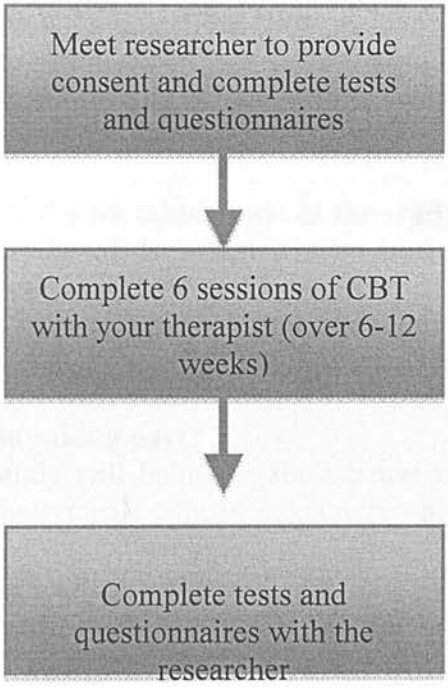
- **Option 2 – Take part in the study**

  If you decide you would like to take part in the study, you should let your clinician know, and they will pass your details on to the researcher to arrange a meeting. During the meeting you will be given the opportunity to ask questions about the study and then if you wish to proceed to complete a consent form. The researcher will interview you about your eating behaviour and collect some basic information. The researcher will then administer a range of neuropsychological tests. These are similar to tests seen on "brain training" games and involve problem solving and pen and paper tasks. These exercises are aimed at improving thinking styles and information processing This will take approximately 45-60 minutes. You will then be given a short break before being asked to fill in 4 questionnaires. In total this will take about 90 minutes. You will then be randomly allocated to Group 1 or Group 2.

  Group 1 (CRT and CBT) – If you are allocated to Group 1 you will initially receive 6 sessions of CRT. Each of these sessions will last between 30 and 45 minutes. Following these sessions you will then receive treatment as usual i.e. CBT. Your participation in the study will involve completing the neuropsychological tests and psychological questionnaires on 3 occasions; (1) before you start treatment as described above (2) following the 6 sessions of CRT (3) following the 6 sessions of CBT. You will be free to not answer any of the questions if you choose. Each appointment should take no longer than 90 minutes.



Group 2 (CBT alone) – If you are allocated to Group 2 you will receive 6 sessions of CBT. Your participation in the study will involve completing the neuropsychological tests and psychological questionnaires on 2 occasions (1) before you start treatment as detailed above (2) following the 6 sessions of CBT. You will be free to not answer any of the questions if you choose. Each appointment should take no longer than 90 minutes.



After participation in the study you will have the opportunity for discussion with the researcher and get general feedback about your neuropsychological test performance.

What will happen if I want to withdraw from the study?
Your participation in the study is entirely voluntary and you are free to withdraw at any time without giving a reason. In the event that you would wish to withdraw, you should inform your therapist. They will inform the researcher. Your identifiable information would be withdrawn from the study, however, the researcher would

retain your non-identifiable data. If you wish to withdraw you would continue to receive your treatment as usual i.e. whatever you are receiving as part of your normal, routine care. Your current and future treatment would in no way be affected if you withdrew.

Will my taking part be kept confidential?
Yes. All the information you provide will be kept confidential and any personal information on questionnaires will be made anonymous. It is common practice for your G.P and the clinician who referred you to be informed of your participation. You will be asked in the participants information form whether you consent to your GP being informed about your participation. During your participation if you indicate that you or another person are at risk of harm e.g. if you felt suicidal, confidentiality would have to be breached and the clinician in your care team will be informed so you can be provided with the appropriate support.

Who has reviewed the study?
The East of Scotland Research Ethics Service REC 1, which has responsibility for scrutinising all proposals for medical research on humans in Tayside, has examined the proposal and has raised no objections from the point of view of medical ethics. It is a requirement that your data in this research be made available for scrutiny by monitors from the University of Edinburgh and NHS Tayside, whose role is to check that research is properly conducted and the interests of those taking part are adequately protected.

Are there any risks associated with taking part in the study?
The questionnaires used in the study are routinely used with patients with no evidence that completing them can cause any harm. You should however be aware that some of the questions focus on psychological difficulties. If you feel unhappy about answering any such questions you should not take part in the study.

Are there any benefits from taking part?
Your participation in the study will help us gain a better understanding of which treatments are effective for individuals with anorexia nervosa.

What should I do if there are any problems?
If you have any problems regarding taking part in the study we would advise you to immediately contact the Chief Investigator of the study (contact details on last page).

If you have a concern about any aspect of the study or the way you have been treated we would advise you to contact the Chief Investigator or the Clinical Supervisor (contact details are provided overleaf) in the first instance who will do their best to address any concerns you have. You may also wish to speak to a clinician for independent advice and the contact details are also provided overleaf

If you remain unhappy and wish to complain formally you can do so at the following:

Complaints and Claims Manager
Complaints and Advice Team
Level 7
Ninewells Hospital
Dundee
DD1 9SY
Freephone: 0800 027 5507
Email: complaints.tayside@nhs.net

What will happen after the study ends?
During and after you complete the study you will continue to receive your treatment as usual i.e. whatever you have already been receiving as part of your normal, routine care.

What will happen with the results of the study?
The study is being written up as the researcher's doctoral thesis at the University of Edinburgh. This will be submitted for publication in a scientific journal and will help inform others about how effective CRT is with individuals with anorexia nervosa. No identifiable information will be included within these documents.

THANK YOU FOR TAKING THE TIME TO READ THIS INFORMATION

CONTACT DETAILS

Should you wish to discuss any aspect of the study please contact:

****
Trainee Clinical Psychologist
Principal Investigator
Email: ********

or

****
Consultant Clinical Neuropsychologist
Chief Investigator
Email: ********

For independent advice on participating in this specific study or research in general please contact:

Dr Alex Yellowlees
Consultant Psychiatrist
The Priory Hospital
Glasgow
Tel: 0141 636 6116
Email: AlexYellowlees@priorygroup.com

Appendix 12

Participant Consent Form

INFORMED CONSENT FORM

Title of Study: The effectiveness of Cognitive Remediation Therapy as a component of treatment for anorexia nervosa.

Name of CI/PI: ********

Please initial box

1. I confirm that I have read and understood the participant information sheet (Version 2, 30th March 2012) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. a I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without any medical care or legal rights being affected. ☐

2. b I understand that if I lose capacity I will be withdrawn from the study – all of my identifiable data will be withdrawn from the study, however, the research team will retain all of my non-identifiable information. ☐

3. I understand that relevant sections of my medical notes and data collected during the study may be looked at by appropriate individuals from the University of Dundee or from NHS Tayside, where it is relevant to my taking part in this research. The Sponsor may appoint a third party to access my medical records or other identifiable data. I give permission for these individuals to have access to my records. ☐

4. I agree to my GP being informed of my participation in the study. ☐

5. I agree to take part in the above study. ☐

Name of participant Date Signature

Name of person taking consent Date Signature

Appendix 13

Cognitive Remediation Therapy Protocol

NHS
Tayside

Cognitive Remediation Therapy

6 Session Manual

Contents Page

Overview of Manual

This manual has been developed in the form of a protocol. The aim of it is to provide guidance, therefore, it is not intended to be prescriptive. CRT sessions should be individually tailored to the needs of each participant. The tasks outlined within this manual should be administered over the course of the 6 sessions, however, which tasks are chosen to be conducted during each session are to be decided by individual therapists.

It is suggested that the behavioural tasks are given to participants at the end of session 6.

The Reflection Questionnaire at the end of the manual should be administered at the end of every session.

Introductory Script

The aim of the introductory script is to give your patient an understanding of why Cognitive Remediation Therapy may be beneficial, how the therapy is thought to work and what to expect from Cognitive Remediation Therapy.

Cognitive Remediation Therapy aims to improve thinking styles and information processing. Many people have set routines that they carry out on a daily basis, for example waking up and then having breakfast. These routines become automatic because we are so used to doing them. This means that we respond to the environment in a certain way, sometimes even when the environment changes and requires us to behaviour in another way.

Our brain is capable of learning and reorganisation. When we use parts of the brain it strengthens the connections between these parts, almost like exercising the brain. Cognitive Remediation Therapy involves paper and pencil tasks, like puzzles. These tasks aim to help to explore new ways of thinking and help enhance problem solving.

Tasks

1. Stroop Task

The aim of this task is to practise switching attention between two different aspects of stimuli or different rules as quickly and as accurately as possible. The task requires individuals to inhibit information. Over the course of the sessions the idea is to increase the number of accurate switches made. The stroop tasks outlined below are individual tasks, therefore, the therapist should decide how many to use within a single session.

Task Instruction

- Pictures Task
  - "This task requires you to switch between saying the word out loud and saying what the picture underneath is as quickly and as accurately as possible".
- Colours Task
  - "This task requires you to switch between saying the word out loud and saying the colour of the ink as quickly and as accurately as possible".
- Circle Square Triangle Task
  - "This task requires you to switch between saying the word in which the shape is written in out loud and the name of the shape as quickly and as accurately as possible".
- Number Boxes Task
  - "This task requires you to switch between saying the number of words written within the box and the word written in the box as quickly and as accurately as possible".
- Compass Boxes Task
  - "This task requires you to switch between saying the compass direction in which the word is placed and what the word says as quickly and as accurately as possible".
- Compass Directions Task
  - "This task requires you to switch between saying the compass direction, the way that the compass is pointing, and the opposite compass direction as quickly and as accurately as possible".
- Clocks Task
  - "This task requires you to switch between saying time on the clock using 24 and 12 hour clocks as quickly and as accurately as possible".

Reflection Questions Guidance

- Did you use any techniques to keep your mind focused on the task?
- Do you use these techniques in day-to-day life?
- Have you learnt anything new about the way you think about situations?
- How can you use what you have learnt in everyday life?

2. Switching Attention Task

The aim of this task is to practise switching attention between two different categories of information as quickly and as accurately as possible whilst remembering the rule that requires you to retain the previous answer. The switching attention tasks outlined below are individual tasks, therefore, the therapist should decide how many to use within a single session.

Task Instruction

- " This task requires you to go though the alphabet and think of animals and place names. The idea is to alternate between saying an animal and saying a place name, for example A Ape, B Belfast, C Cheetah etc".
- " This task requires you to go through the alphabet and think of female and male names. The idea is to alternate between saying a female name and saying a male name, for example A Anna, B Ben, C Catherine etc".
- " This task requires you to go through the alphabet and think of female and place names. The idea is to alternate between saying a female name and saying a place name, for example A Alex, B Berlin, C Claire etc".
- " This task requires you to go though the alphabet and think of animals and place names. The idea is to alternate between saying an animal and saying a male name for example A Antelope, B Ben, C Cat etc".
- " This task requires you to go though the alphabet and think of fruit and place names. The idea is to alternate between saying a fruit and saying a place name, for example A Apple, B Budapest, C Clementine etc".

Reflection Questions Guidance

- How did you hold the 2 types of information needed in your mind at the same time?
- When you were doing the task did anything distract you that meant you found it difficult to remember the task demands?
- When might you be required to switch your attention between 2 different things in everyday life?

3. Estimation Task

The aim of this task is to practise approximating and estimating. The task requires you to consider things being good enough instead of perfect. The estimation tasks outlined below are individual tasks, therefore, the therapist should decide how many to use within a single session.

Task Instruction

- Lines Task
  - "This task requires you to estimate where you think the middle is on each of lines is. The line does have to be perfectly in the middle instead it should be a rough estimate. Could you please start at the top of the page and not miss out any of the lines".
- Circles Task
  - "This task requires you to estimate where you think the middle is on each of circles is. The line does have to be perfectly in the middle instead it should be a rough estimate. Could you please start at the top of the page and not miss out any of the circles".
- Squares Task
  - "This task requires you to estimate where you think the middle is on each of squares is. The line does have to be perfectly in the middle instead it should be a rough estimate. Could you please start at the top of the page and not miss out any of the squares".

Reflection Questions Guidance

- Did you use any techniques to guide where you estimated the middle to be?
- How do you feel about guessing about things? Do you prefer to main an informed decision?
- When can it be good to guess? When can it not be good?
- Do you feel like you have to provide the right answer and spend time looking at all of the details or do you make a decision that is maybe not prefect, but acceptable?
- How can you use this experience of estimating in everyday life?

4. Up and Down Task

The aim of this task is to practise switching your attention based on rule changes. The task requires individuals to change their responses following changing environmental demands as quickly and as accurately as possible. The up and down tasks outlined below are individual tasks, therefore, the therapist should decide whether to use both within a single session.

Task Instruction

- Ski Lift Task
    - "The ski lift shown in the pictures is going up and down the mountain. The task requires you to go through the pictures using the big arrows in the boxes to inform you whether the lift is going up or down. When the arrow appears please say out loud either up or down depending on the direction the arrow is pointing. Then count the following pictures in the direction that the arrow is pointing for example, if the arrow points down, count backwards. Please start at the top left corner and work as quickly and as accurately as possible".
- Ladders Task
    - "The man shown in the pictures is going up and down the ladder. The task requires you to go through the pictures using the big arrows in the boxes to inform you whether the man is going up or down. When the arrow appears please say out loud either up or down depending on the direction the arrow is pointing. Then count the following pictures in the direction that the arrow is pointing for example, if the arrow points down, count backwards. Please start at the top left corner and work as quickly and as accurately as possible".

Reflection Questions

- How did you find this task?
- Did you use any techniques to help you?
- How might you use these techniques in everyday life?

5. Card Stack Task

The aim of this task is to place cards on top of each other following different sorting rules. It requires the individual to switch between different categories consisting of colour, number and suit. Both the therapist and the patient put down cards in an alternate manner. Further both the therapist and the patient switch the sorting principle alternatively.

Task Instruction

- "This task is a bit like the card game snap. It requires you to place cards down following a sorting rule. I shall start by placing the Queen of Diamonds down and saying that the sorting rule is diamonds. It is then your turn to place a card down on the pile that follows this sorting rule. We take it in turns to decide when the sorting rule should change and what the new sorting rule should be".

Reflection Questions Guidance

- How did you decide which card to place on the stack?
- Did you choose accuracy over speed or speed over accuracy?
- Did you ever want to put another card down but decide that it was the wrong choice?
- How might you use this way thinking in everyday life?
    - For example, sorting clothes for washing machine.

6. Maps Task

The aim of this task is to encourage individuals to be flexible when they are providing directions. Individuals are required to develop different routes whilst paying attention to different features on the map and remembering the end destination. If they initially cannot think of an alternate route then suggest some of them. The maps tasks outlined below are individual tasks, therefore, the therapist should decide how many to use within a single session.

Task Instruction

- Maps Task 1
  - "This task requires you to navigate a map out loud using different cues. Please look at the map and pay attention to all of the different features.
    - Go from the bank to Menton Street. What other routes could you have taken?
    - Using street names, go from Terence Street to Pollux Street. What alternative routes could you have taken?
    - Now using compass directions and landmarks go from Queen Street to the market. What other routes could you have taken?"
- Maps Task 2
  - "This task requires you to navigate a map out loud using different cues. Please look at the map and pay attention to all of the different features.
    - Use compass directions to go from Farm Way to the boat on the river.
    - Use landmarks to go from the big forest to the farmer's cottage.
    - Use landmarks to go from the blue road to the big forest."
- Maps Task 3
  - "This task requires you to navigate a map out loud using different cues. Please look at the map and pay attention to all of the different features.
    - Pick up dry cleaning, pick up photographs, buy the following items; food for dog, face cream, memory stick for computer; return DVDs to the library, buy new shoes, relax over lunch.
    - Do the same journey but using compass directions.
    - Do the same journey using left, right, up and down."

Reflection Questions Guidance

- Why did you choose the route you chose?
- Did you think about the route in your head before you navigated it or did you make up the route as you went along?
- How difficult was it to choose different routes?
- How might you use this way of thinking in everyday life?

7. Prioritising task

The aim of this task is to encourage individuals to plan ahead taking into account the importance of tasks to be completed. This task can be used in a number of sessions as alternative task events can be used, for example, planning a party or planning a holiday.

Task Instruction

" This task requires you to plan an event. How would you go about planning a train journey to another part of the country? Think about all of the different things you would have to do from the most important thing to the least important thing and write them down. What would be the first thing you would do?"

Reflection Questions Guidance

- How did you find this task?
- Did you find it easy to organise or did you find it difficult to prioritise?
- Did you remember the event you were planning all the way through the task?
- Can you think of the last time you planned an event? How did you find it?

8. How to… Task

The aim of this task is to practise describing things in a clear and concise manner. It requires individuals to think about the main points that need to be conversed and conveying them in a way in which others will be able to understand to effectively execute an activity. This task can be used in a number of sessions as alternative task demands can be used, for example, how to play snakes and ladders or how to bake a cake.

Task Instruction

- How to plant a sunflower.
    - "This task requires you to describe an activity so that someone else could complete it in an effective way. Please describe how to plant a sunflower."
    - Prompts can be given to encourage the participant.
        - "What are the main points that you need to convey to tell someone how to plant a sunflower?"
        - "What would the steps to complete the task be in order?"
        - "Think about words that can link your steps, for example first, then."
        - "What type of equipment or materials would you need?"

Reflection Questions Guidance

- How did you find this task?
- Were you able to summarise the main points needed to complete the activity or did you describe every detail?
- What have you learnt about the way that you think about things?

9. Search and Count Task

The aim of this task is to practice switching between different aspects of a bigger picture or between different rules as quickly and as accurately as possible.

Task Instruction

This task requires you to point out different shapes. Starting at the top left please point to the circles.

- After the first 2 lines – "Please start counting up to 20 at the same time as pointing to the circles."
- Following another 4 lines – "Please start pointing to the circles at the same times as counting up to 20."
- Following another 4 lines – "Please starting pointing to the circles and then the triangles in an alternate manner whilst counting to 20."

Reflection Questions Guidance

- How did you find this task?
- Did you choose accuracy over speed or speed over accuracy?
- Were you able to focus on the task or did you become distracted at all and lose you place?

10. Switching Time Zones Task

The aim of this task is to practise switching between different information whilst remembering a rule.

Task Instruction

Please look at this map and use it to help answer the following questions.

- "A conference call needs to be arranged between companies in 3 different countries, New York, London and Dubai. The company in London is the host and wishes to start at 11am. What time will it be in the other 2 cities?"
- "It is New Years Eve and each capital city is having a fireworks display. Kuala Lumpur is the first city to have their display as it strikes midnight there first. What time will it be in each of the other cities shown above? When is it midnight in Dubai and what time will it be in Kuala Lumpur? When it is midnight in New York will it be in Honolulu?"
- "Joanna, who lives in London, would like to Skype her niece who lives in Dubai. Preferably at around 3pm on Saturday. What time should her niece be online? Granny, who lives in New York, would also like to be involved in the conversation, what time should she go online?"

Reflection Questions Guidance

- How did you find this task?
- Do you find it difficult to multitask?
- Did you use any techniques to help you complete the tasks?
- Have you learnt anything new about the way you think about situations?
- When is it useful to switch attention quickly?

11. Main Ideas Task

The aim of this task is to encourage thinking about the "bigger picture". Individuals are required to extract relevant information from a large amount of written text, therefore, having to resist from focusing on smaller details.

Task Instruction

- Please read this information and try to summarise the main points in 2 sentences.
- If the individual finds this task too difficult ask them to summarise a paragraph at a time. Over the course of the 6 sessions aim to increase the amount of information given to be summarised.
- It may also be helpful if the task is perceived as difficult to provide small hints, for example suggesting the use of bullet points or trying to give a headline for each paragraph.

Reflection Questions Guidance

- How did you find this task?
- How did you summarise the information as you read through it?
- What made you decide on the information you chose to summarise the text?
- In what way can you relate this task to an everyday situation?
    - For example, are you able to follow a conversation or do you get distracted by one piece of information?

Behavioural Tasks

The strategies learnt during these treatment sessions will hopefully help you to make small behavioural changes in your everyday life. Below is a list of examples of behavioural changes, however, it would also be good to discuss any ideas that you might have.

1. Relaxing
   - Listen to a different radio station.
   - Watch different TV programmes.
   - Read a different newspaper or magazine.
   - Read some parts of the newspaper or magazine instead of reading from cover to cover.
   - Listen to a whole album on you iPod or MP3 player instead of skipping songs or listening to your favourites list.
   - Shop for new items that are not related to food, for example, candles or bubble bath.
   - Go to the cinema or an art gallery.
   - Wear your hair in a different style.

2. Changing routines at home
   - Change you cleaning routine.
   - Change your morning or night time routine.
   - Shop for different brands, for example, different brand of soap or washing up liquid.
   - Sit in different places at mealtimes.
   - Leave the house untidy before you go out and tidy it when you get back.

3. Changing routines at work
   - Change your route to work.
   - Choose a different ringtone for your mobile phone.
   - Change the clock setting from 12 hour to 24 hour or vice versa.
   - Estimate the time rather than wearing a watch.

Reflection Questionnaire

1. **Were you satisfied with your session today?** Yes/No

2. **Is it hard for you to do more than one thing at once?** Yes/No

3. **Did you use any techniques to help you with the tasks today?** Yes/No
   If yes, what techniques did you use?

.....
.....

4. **Have you learned anything new about the way you think about things?** Yes/No
   If yes, what have you learned?

.....
.....

5. **Do you think you can use what you have learned today in everyday life?** Yes/No

6. **How useful did you find the session today?**

   Very useful Useful Not at all useful

7. **In comparison to how you were prior to treatment how would you rate how much you have changed?**

   Much Improved
   Minimally Improved
   No Change
   Minimally Worse
   Much Worse

Thank you for completing this questionnaire.

Appendix 14

Cognitive Behavioural Therapy Protocol

NHS
Tayside

Cognitive Behavioural Therapy

6 Session Manual

Contents Page

Overview of Manual

This manual has been developed in the form of a protocol. The aim of it is to provide guidance, therefore, it is not intended to be prescriptive. CRT sessions should be individually tailored to the needs of each participant. The tasks outlined within this manual should be administered over the course of the 6 sessions, however, which tasks are chosen to be conducted during each session are to be decided by individual therapists.

The Reflection Questionnaire at the end of the manual should be administered at the end of every session.

Introductory Script

The aim of the introductory script is to give your patient an understanding of why Cognitive Behavioural Therapy may be beneficial, how the therapy is thought to work and what to expect from Cognitive Behavioural Therapy.

Cognitive Behavioural Therapy aims to help people to learn to recognise negative thinking styles. It involves learning to apply thinking skills to situations that may be difficult and finding alternative ways of thinking that will help to change behaviour. Making connections between your body and how you think, feel and behave has been found to help people to make changes to these aspects of their lives.

Topics

1. Psycho education

The aim of this topic is to provide education about and explain the multiple functions of anorexic symptomatology.

- Positive Reinforcement
  - It has been proposed that a sense of achievement, self-control and superiority, resulting from successful weight loss, further maintains anorexia nervosa.
  - The role of social reinforcement in the initial weight loss and self-control has also been argued.
    - The media suggests that thinness is a sign of success and beauty.
    - The initial weight loss may result in increased parental attention and concern.

- Negative Reinforcement
  - Many individuals view avoidance as a significant factor in the development and maintenance of the condition.
    - Dieting and weight loss have been proposed to maintain avoidance from fears associated with high performance expectations, sexuality, separation from family and family conflict has been suggested.

- Adaptive functions of anorexia nervosa
  - It can be useful to provide the individual with an initial individualised abstract formulation of their personal meaning of the condition.
    - For example, highlighting the precipitating and perpetuating factors
  - The adaptive functions can be highlighted as a reason for the maintenance of their condition and the resistance to change their behaviour.
  - Changed eating patterns and weight gain can be placed within the wider context of achieving personal goals such as perceived competence, contentment and happiness.

2. Cognitive rationale for treatment

The aim of this topic is to introduce the treatment method without "teaching" the cognitive methodology. It is suggested that the cognitive behavioural approach is gradually introduced over a number of treatment sessions.

- Cognitive rationale can be introduced by reflecting on the psycho education. The role of psycho education is to change beliefs by providing new corrective information.
- Highlighting the link between beliefs or assumptions and behaviour in an abstract manner without trying to identify and modify the individual's maladaptive beliefs.

3. Advice for restoring normal nutrition and body weight

The aim of this topic is to introduce small weight gains as a behavioural experiment rather than a commitment to full recovery. This topic should be individually tailored to motivation levels.

- Explaining the need to assess weight.
    - Emphasising the link between physical and psychological wellbeing.
    - Weight change as an ongoing measure of the effectiveness of treatment.
- Determining minimum weight (unless weight has been stable and there are no other indications for the need for hospitalisation).
    - Individuals need to be informed that they will only receive outpatient treatment if their weight does not fall below a set minimum.
- Setting a target body weight range (depending on the motivation levels of the individual).
    - Explaining the significance of reaching a target weight goal and emphasising that the achievement of this goal is important for overall recovery.
- Introducing the experimental model of change.
    - Explaining that small experiments that are planned collaboratively will be set up to test hypotheses regarding weight gain and beliefs.

4. Normalised Eating Patterns

This topic aims to introduce the use of collaboratively designed meal plans that are written in detail.

- Predetermined eating plans
  - Developing prescriptive eating plans detailing set eating times and specifying specific foods and the amount to be consumed.
- Spacing eating
  - Most individuals attempt to save calories so that they can have food later in the day or hope that they can avoid eating altogether. This leads to hunger, which can lead to binge eating behaviour. It is therefore important to explain that eating food should be spaced out over the day.
  - Highlighted that breakfast should never be skipped and that 3 meals and up to 2 snacks spread throughout the day should be consumed.
  - Explaining that spacing eating will minimise food cravings, urges to eat and feelings of loss of control.
- Increasing the quantity of food consumed
  - It is recommended that calorie intake should be increased to result in a weight gain of 1 to 2 pounds per week.
  - It should be noted that speed of weight gain is not as important as the direction of steady gradual weight gain.
- Increasing the range of food consumed
  - Explaining that in most cases one of the goals for treatment will be to increase the range of foods consumed.
  - The eating plan should include small amounts of food that was previously avoided.

5. Strategies for interrupting bingeing and purging behaviours

The aim of this topic is to interrupt the binge eating and vomiting cycle.

- Delaying
  - Asking the individual to delay either bingeing or purging for a collaboratively agreed set period of time (for example 30 minutes).
  - Explaining that the urge to engage in behaviour decreases over time.
  - Organising a set activity to carry out within this time period can be useful.
- Distracting
  - Many individuals with anorexia nervosa experience heightened anxiety after eating or when confronted with specific situations.
  - Explaining that the use of distraction can help with this anxiety and collaboratively setting specific distracting tasks.
  - The aim is to interrupt the automatic thoughts leading to either bingeing or purging behaviours.
- Planning alternative behaviours
  - It can be useful to plan specific behaviours to engage in to disrupt the binge-purge cycle.
  - Explaining that for this strategy to work the individual has to agree to carry out the alternative behaviour prior to acting on either a binge or purge behaviour urge.
  - It is recommended that the alternative behaviours are practical. Examples include leaving the house to go for a walk, phoning friends or family for support or watching a film or the TV.

6. Increasing motivation to change

The aim of this topic is to emphasise the motivational and functional features of both behaviours and beliefs. It is also important to discuss resistance to change.

- Stages of motivation
    - Precontemplation – no intention to change
    - Contemplation – aware of the issue but no commitment to change
    - Preparation – intending to initiate and take action, but not having done so within the past year
    - Action – taking action and modifying beliefs, behaviour or environment to address the issue
    - Maintenance – consolidation of gains and relapse prevention
- Accepting that that individual's beliefs are currently genuine and functional
    - Explicitly conveying an understanding of these beliefs.
- Highlighting the positives and negatives of maintaining the condition
    - Collaboratively detailing an explicit list of the positives and negatives whilst emphasising the adaptive functions of the symptoms.
    - The aim is to identify functional hierarchical goals relating to competency, autonomy and independence.
    - Beginning to introduce doubts regarding the practicality of anorexia nervosa as a means of meeting these goals.
- Thinking of the future
    - Asking individuals to think about whether their current condition will help them to reach their long-term goals.
    - Discussing what role anorexia nervosa will play in their lives in the future.
    - Highlighting any change and discussing how this change will happen.

7. Identifying dysfunctional thinking patterns

The aim of this topic is to highlight that behaviour results from underlying beliefs and assumptions that can be identified, challenged and modified.

- Cognitive schemas
  - Explaining that cognitive schemas are cognitive frameworks that help to organise and interpret information.
  - Explaining that in anorexia nervosa weight and shape often become the frameworks for how experiences are organised and interpreted.
- Resistant nature of schemas
  - Discussing the relatively stable nature of schemas and highlighting that the stability results in them being resistant to change, however, not immune.
- Motivation to maintain congruence amongst schemas
  - Explaining that individuals actively avoid discrepancy between past, current and anticipated information sources.
  - It has been suggested that the existence of information that does not fit with our schemas is a motivating factor for change.
- Dysfunctional thinking patterns
  - Explaining that it is important to recognise that automatic thinking patterns influence the way we interpret experiences and impact on our ability to understand and change our behaviour.
    - Example of dysfunctional thinking patterns include:
      1. over generalisation - a rule based on one event
      2. magnification - overestimation of significance of undesirable event
      3. all or nothing thinking - thinking in absolute terms
      4. personalisation - over interpretation of events relating to the self
      5. selective abstraction – basing a conclusion on small details whilst ignoring contradictory evidence

8. Developing cognitive restructuring skills
The aim of this topic is to examine and modify dysfunctional thinking.

- Beginning to monitor thinking and increasing the awareness of thinking patterns.
- Encouraging the individual to articulate the dysfunctional beliefs and identify them in their simplest form.
    - Listening to the individual and attempting to condense complicated ideas into brief summaries.
- Collaboratively examining the positives and negatives of the usefulness of the dysfunctional beliefs and coming to a reasoned conclusion.
- Using the conclusion to collaboratively explicitly set behavioural changes (behavioural experiments).
- Using evidence gained from the behavioural changes to encourage the development of more realistic interpretations.
- Encouraging the gradual modification of underlying assumptions reflected by the dysfunctional beliefs.

9. Modifying concepts of the self

The aim of this topic is to modify self-esteem and self-awareness.

- Self-esteem
  - It has been suggested that low self-esteem often predates the manifestation of anorexia nervosa.
  - Collaboratively identifying assumptions about the self in a clear statement. For example, "I do not feel like a worthwhile person".
  - It can be helpful to have a generalised discussion regarding self-worth and then apply what has been learnt to the previously identified assumption.
  - Collaboratively examining the advantages and disadvantages of the assumption.
  - Aiming to help the individual question the usefulness of their perception of their self worth.
  - Encouraging the process of self-acceptance and developing adaptive new goals.
- Self-awareness
  - Aiming to help individuals to be able to label and express their emotions.
  - Encouraging the individual to become aware of their emotions and actively work with them.
  - Examining any conflict between how the individual thinks they should feel and their actual feelings.

10. Summarising progress and areas of continued vulnerability

The aim of this topic is to review progress made to date and highlighting areas of vulnerability.

- Summarising progress
    - Reviewing improvements made in eating disorder symptoms, thinking patterns, self-esteem and overall lifestyle.
- Discussing the limited positive outcomes of anorexia nervosa
- Summarising areas of continued vulnerability
    - Highlighting that vulnerability to an eating disorder can continue for many years.
    - Discussing the individual's areas of potential vulnerability.
        - For example, work stress, difficult relationships, and life transitions/events.
    - Highlighting that vulnerability to relapse increases during periods of psychological distress.
    - Developing adaptive strategies for helping to cope with psychological distress.

11. Reviewing the warning signs of relapse

The aim of this topic is to review the early signs of relapse.

- Reviewing potential early signs of relapse
  - For example, weight and shape preoccupation, gradual or rapid weight loss, sudden weight gain and loss of menstrual cycle.
- Detailing the warning signs and aiming to make them as concrete as possible.

12. Reviewing fundamentals of continued progress

The aim of this topic is to review the key aspects of treatment that have facilitated improvement.

- Collaboratively reflecting on the key aspects of treatment that have resulted in symptomatic improvement.
- Summarising the coping strategies that have been learnt during the course of treatment and highlighting the need for continued use of these.

Reflection Questionnaire

8. **Were you satisfied with your session today?** Yes/No

9. **Is it hard for you to do more than one thing at once?** Yes/No

10. **Have you learned anything new about the way you think about things?** Yes/No
    If yes, what have you learned?

.....
.....

11. **Do you think you can use what you have learned today in everyday life?** Yes/No

12. **How useful did you find the session today?**

    Very useful Useful Not at all useful

13. **In comparison to how you were prior to treatment how would you rate how much you have changed?**

    Much Improved
    Minimally Improved
    No Change
    Minimally Worse
    Much Worse

Thank you for completing this questionnaire.